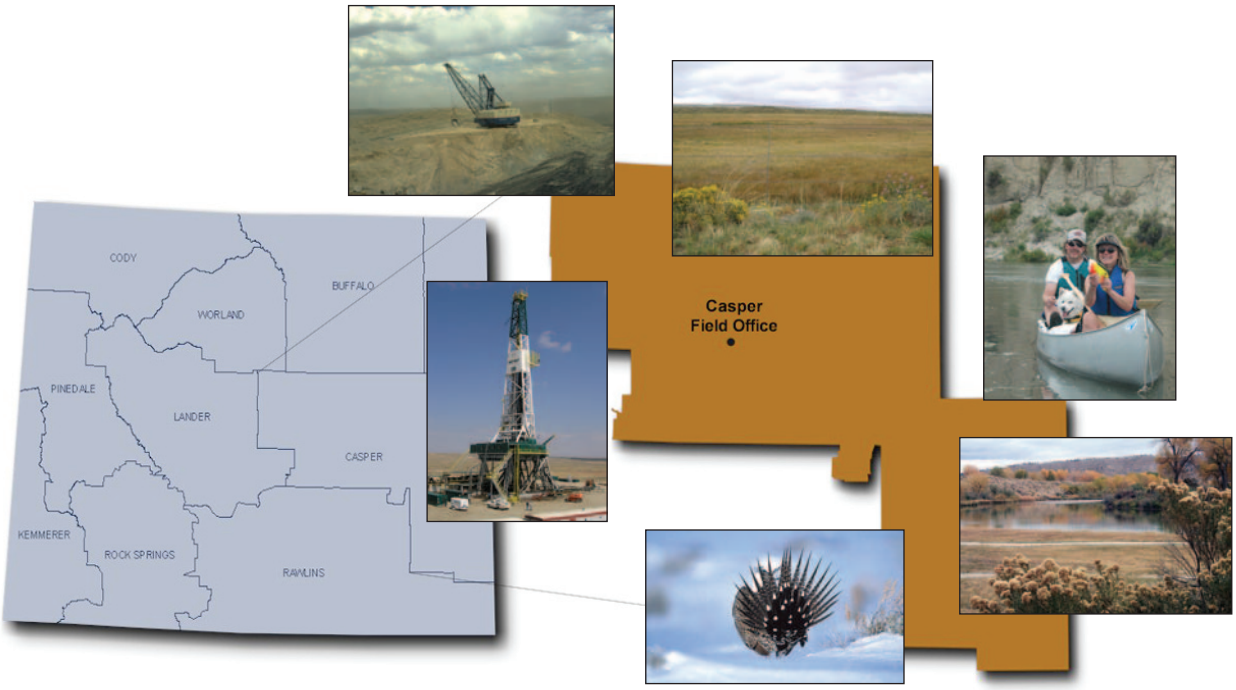
BLM

DRAFT
Resource Management Plan and Environmental Impact Statement for the Casper Field Office Planning Area



Volume 1 of 2
Chapters 1 – 6

Wyoming State Office - Casper Field Office

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

July 2006

MISSION STATEMENT

It is the mission of the Bureau of Land Managment to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

BLM/WY/PL-06/016+1610

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Wyoming State Office
P.O. Box 1828
Cheyenne, Wyoming 82003-1828

TAKE PRIDE IN AMERICA

In Reply Refer To:

1793(930)
1610

Dear Reader:

Attached for your review and comment is the Draft Resource Management Plan and Environmental Impact Statement (Draft RMP/EIS) for the Bureau of Land Management (BLM), Casper Field Office. This document was prepared by the BLM in cooperation with the Environmental Protection Agency, National Park Service, State of Wyoming, county governments, and conservation districts located in the planning area.

The planning area is located in east-central Wyoming and includes approximately 8.5 million acres of land in most of Natrona County, and all of Converse, Goshen, and Platte Counties. Within the Casper planning area, the BLM administers approximately 1.4 million acres of public land surface and 4.7 million acres of Federal mineral estate. When approved, the RMP will replace the 1985 Platte River RMP. To reflect changes in administrative units, the revised plan is titled the Casper RMP.

The Draft RMP/EIS describes and analyzes five alternatives for future management of public lands and resources administered by the BLM. While a preferred alternative is identified, selection of the final plan has not been made. The final decision will be made only after consideration of the comments received on the Draft RMP/EIS.

Your review and comment on the content of this document are critical to the success of this planning effort. If you wish to submit comments on the Draft RMP/EIS, we request that you make them as specific as possible. Comments will be more helpful if they include suggested changes, sources or methodologies, and reference to a section or page number. Comments that contain only opinions or preferences will be considered and included as part of the decision making process, although they will not receive a formal response from the BLM. Comments will be accepted for ninety (90) calendar days following the Environmental Protection Agency's (EPA) publication of its Notice of Availability in the Federal Register. The BLM can best utilize your comments and resource information submissions if received within the review period.

Written comments may be submitted as follows:

1. The Casper RMP Revision website at *www.blm.gov/rmp/casper/* is designed to allow commenters to submit comments electronically by resource subject directly onto a

comment form posted on the website;

2. Comments may be uploaded in an electronic file directly to the above website;

3. Written comments may be mailed directly, or delivered to, the BLM at:
   Casper RMP/EIS
   Bureau of Land Management Casper Field Office
   2987 Prospector Drive
   Casper, WY 82604-2968

4. Written comments may be submitted during the public meetings or hearings.

The BLM has scheduled several public meetings to provide the public with additional opportunities to submit comments, and seek additional information.

Wheatland	August 28, 2006	Platte County Library Large Meeting Room 904 9th St. Wheatland, WY	3 p.m. to 8 p.m.
Torrington	August 29, 2006	Eastern Wyoming College Community Training Center Building, Large Conference Rm. 3200 W. C St. Torrington, WY	3 p.m. to 8 p.m.
Douglas	August 30, 2006	Converse County Courthouse Community Room 107 N. 5th St. Douglas, WY	3 p.m. to 8 p.m.
Casper	August 31, 2006	BLM Casper Field Office 2987 Prospector Drive Casper, Wyoming	3 p.m. to 8 p.m.

To facilitate analysis of comments and information submitted, we strongly encourage you to submit comments in an electronic format through either the website or electronic mail.

Comments, including names and street addresses of respondents, will be available for public review in their entirety at the Casper Field Office during regular business hours (7:45 a.m. to 4:30 p.m.), Monday through Friday, except holidays, and will be published as part of the Proposed RMP and Final EIS. Individual respondents may request confidentiality. If you wish to withhold your name or street address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your comments. Such requests will be honored to the extent allowed by law. All submissions from organizations

or businesses and from individuals identifying themselves as representatives or officials of organizations or businesses will be made available for public inspection in their entirety.

Copies of the Draft RMP/EIS have been sent to affected Federal, State, and local government agencies and to those persons who indicated they wished to receive a copy of the Draft RMP/EIS. Copies of the Draft RMP/EIS are available for public inspection at the following BLM locations:

Bureau of Land Management Wyoming State Office 5353 Yellowstone Road Cheyenne, Wyoming 82009	Bureau of Land Management Casper Field Office 2987 Prospector Drive Casper, Wyoming 82604

BLM thanks our cooperating agencies who have participated in the planning process and helping us complete this document. We look forward to your continued interest and participation.

For additional information or clarification regarding this document or the planning process, please contact Linda Slone, RMP Project Manager at (307) 261-7600.

Sincerely,

Robert A. Bennett
State Director

This page intentionally left blank.

Volume 1of 2

Draft
Resource Management Plan and Environmental Impact Statement for the Casper Field Office Planning Area

U.S. Department of the Interior
Bureau of Land Management
Casper Field Office, Wyoming

July 2006

This page intentionally left blank.

Casper Field Office Planning Area
Draft Resource Management Plan and Environmental Impact Statement

Lead Agency: U.S. Department of the Interior, Bureau of Land Management

Type of Action: Administrative

Jurisdiction: Most of Natrona and all of Converse, Goshen, and Platte counties, Wyoming

Abstract: This Draft Resource Management Plan (RMP) and Environmental Impact Statement (EIS) describes and analyzes alternatives for the planning and management of public lands and resources administered by the Bureau of Land Management (BLM), Casper Field Office. The Casper planning area is located in east-central Wyoming and includes approximately 8.5-million acres of land in most of Natrona County and all of Converse, Platte, and Goshen counties. The BLM Lander Field Office administers public land in the southwestern corner of Natrona County. Within the Casper planning area, the BLM manages approximately 1.4-million acres of BLM-administered public land surface and 4.7-million acres of federal mineral estate.

The BLM is revising the RMP to address the availability of new data and policies, emerging issues, and changing circumstances that have occurred during the 20 years since the Record of Decision for the existing plan was signed. As part of the RMP revision process, the BLM conducted a scoping period to solicit input from the public and interested agencies on the nature and extent of issues and impacts to be addressed in the Draft EIS. Planning issues identified for this RMP revision focus on energy and mineral development; vegetation and habitat management; land ownership adjustments; access to public lands; transportation; and special designations.

To assist the agency decisionmaker, cooperating agencies, and the public in focusing on appropriate solutions to planning issues, five alternative RMPs are considered in the Draft EIS. **Alternative A** is a continuation of current management (No Action Alternative). Under this alternative, use of public lands and resources continue to be managed under the 1985 Platte River RMP, as amended. **Alternative B** emphasizes conservation of physical, biological, and heritage resources, while providing for the smallest level of development. **Alternative C** provides more conservation and less resource development than current management and falls between alternatives B and D relative to resource conservation and resource development. **Alternative D** emphasizes resource development, while providing for the smallest level of conservation of physical, biological, and heritage resources. **Alternative E** is the BLM's Preferred Alternative at this stage in the process (the Draft RMP/EIS). It is not a final agency decision; it is an indication of the agency's preliminary preference because it reflects the best combination of decisions to achieve BLM goals and policies, meets the purpose and need, addresses the key planning issues, and considers the recommendations of cooperating agencies and BLM specialists.

When completed, the RMP revision will provide a set of comprehensive, long-range decisions for: (1) managing resources throughout the planning area and (2) identifying allowable uses on the public land surface and federal mineral estate administered by the BLM. Comments are accepted for 90 days following the date the U.S. Environmental Protection Agency publishes the Notice of Availability for this Draft EIS in the *Federal Register*. Comments should be submitted via the RMP web site at www.blm.gov/rmp/casper. Alternatively, comments can be faxed to (307) 261-7587 or mailed to:

Bureau of Land Management, Casper Field Office
Attn: Linda Slone
2987 Prospector Drive
Casper, Wyoming 82604-2968

This page intentionally left blank.

VOLUME 1
TABLE OF CONTENTS

EXECUTIVE SUMMARY ES-1
CHAPTER 1 PURPOSE AND NEED FOR ACTION 1-1
1.1 Introduction and Background 1-1
1.1.1 Historical Overview 1-1
1.1.2 Land Ownership Within the Casper Field Office Planning Area 1-3
1.2 Purpose and Need for the Resource Management Plan Revision 1-4
1.2.1 Purpose 1-4
1.2.2 Need for Revising the Existing Plan 1-5
1.3 Planning Process 1-7
1.3.1 Nine-Step Planning Process 1-7
1.3.2 Resource Management Plan Implementation 1-8
1.4 Decision Framework 1-9
1.4.1 Planning Issues 1-9
1.4.2 Planning Criteria 1-11
1.4.3 Relevant Statutes, Limitations, and Guidelines 1-12
1.4.4 Other Related Plans 1-13
1.5 Consultation and Coordination 1-13
1.5.1 Consultation and Coordination 1-13
1.5.2 Public Involvement 1-16
1.6 Topics Not Addressed in This Resource Management Plan Revision 1-23
CHAPTER 2 RESOURCE MANAGEMENT ALTERNATIVES 2-1
2.1 Alternative Formulation 2-2
2.2 Alternative Components 2-2
2.2.1 Desired Outcomes (Goals and Objectives) 2-2
2.2.2 Allowable Uses and Management Actions 2-3
2.2.3 Reasonable Foreseeable Development and Reasonable Foreseeable Action Scenarios 2-3
2.3 Alternatives Considered, but Not Carried Forward for Detailed Analysis 2-4
2.4 Alternatives Considered In Detail 2-7
2.4.1 Alternative A (No Action Alternative) 2-16
2.4.1.1 Overview of the Alternative 2-16
2.4.1.2 Physical, Biological, and Heritage Resources 2-16
2.4.1.3 Resource Uses and Support 2-17
2.4.1.4 Special Designations 2-18
2.4.2 Alternative B 2-18
2.4.2.1 Overview of the Alternative 2-18
2.4.2.2 Physical, Biological, and Heritage Resources 2-18
2.4.2.3 Resource Uses and Support 2-19
2.4.2.4 Special Designations 2-20
2.4.3 Alternative C 2-20
2.4.3.1 Overview of the Alternative 2-20
2.4.3.2 Physical, Biological, and Heritage Resources 2-20
2.4.3.3 Resource Uses and Support 2-21
2.4.3.4 Special Designations 2-22
2.4.4 Alternative D 2-22
2.4.4.1 Overview of the Alternative 2-22
2.4.4.2 Physical, Biological, and Heritage Resources 2-22
2.4.4.3 Resource Uses and Support 2-23
2.4.4.4 Special Designations 2-24
2.4.5 Alternative E (Preferred Alternative) 2-24
2.4.5.1 Overview of the Alternative 2-24
2.4.5.2 Physical, Biological, and Heritage Resources 2-24
2.4.5.3 Resource Uses and Support 2-25
2.4.5.4 Special Designations 2-25

2.5 Details of Alternatives 2-26
2.6 Summary of Environmental Consequences by Alternative 2-102
CHAPTER 3 AFFECTED ENVIRONMENT 3-1
3.1 Physical Resources 3-4
3.1.1 Air Quality 3-4
3.1.2 Geologic Resources 3-9
3.1.3 Soil 3-11
3.1.4 Water 3-12
3.2 Mineral Resources 3-17
3.2.1 Locatable 3-17
3.2.2 Leasable – Coal 3-18
3.2.3 Leasable – Geothermal 3-20
3.2.4 Leasable – Oil and Gas 3-20
3.2.5 Leasable – Other Solid Leasables 3-29
3.2.6 Salable 3-29
3.3 Fire Management and Ecology 3-31
3.3.1 Unplanned/Wildland Fire 3-31
3.3.2 Planned/Prescribed Fire 3-32
3.3.3 Rehabilitation 3-33
3.4 Biological Resources 3-34
3.4.1 Vegetation – Forests, Woodlands, and Forest Products 3-37
3.4.2 Vegetation – Grassland and Shrubland Communities 3-39
3.4.3 Vegetation – Riparian and Wetland Communities 3-44
3.4.4 Vegetation – Invasive, Nonnative Plant Species and Pest Control 3-47
3.4.5 Fish and Wildlife Resources – Fish 3-51
3.4.6 Fish and Wildlife Resources – Wildlife 3-53
3.4.7 Special Status Species – Plants 3-65
3.4.8 Special Status Species – Fish 3-71
3.4.9 Special Status Species – Wildlife 3-72
3.5 Heritage and Visual Resources 3-84
3.5.1 Cultural Resources 3-84
3.5.2 Paleontological Resources 3-86
3.5.3 Visual Resources 3-89
3.6 Land Resources 3-92
3.6.1 Lands and Realty 3-92
3.6.2 Renewable Energy 3-97
3.6.3 Rights-of-Way and Corridors 3-99
3.6.4 Transportation 3-100
3.6.5 Off-Highway Vehicles 3-102
3.6.6 Livestock Grazing 3-103
3.6.7 Recreation 3-108
3.7 Special Designations 3-112
3.7.1 Areas of Critical Environmental Concern and Special Management Areas 3-112
3.7.1.1 Existing ACECs and SMAs 3-112
3.7.1.2 Proposed ACECs and SMAs 3-114
3.7.2 National Back Country Byways 3-120
3.7.3 National Historic Trails and Other Historic Trails 3-121
3.7.4 Wild and Scenic Rivers 3-123
3.8 Socioeconomic Resources 3-125
3.8.1 Social Conditions 3-125
3.8.2 Economic Conditions 3-128
3.8.3 Health and Safety 3-136
3.8.4 Environmental Justice 3-138
3.8.5 Tribal Treaty Rights 3-139

CHAPTER 4 ENVIRONMENTAL CONSEQUENCES 4-1
4.1 Physical Resources 4-5
4.1.1 Air Quality 4-5
4.1.1.1 Methods and Assumptions 4-5
4.1.1.2 Analysis of Alternatives 4-7
4.1.1.3 Conclusion 4-11
4.1.2 Geologic Resources 4-11
4.1.3 Soil 4-12
4.1.3.1 Methods and Assumptions 4-13
4.1.3.2 Analysis of Alternatives 4-13
4.1.3.3 Conclusion 4-17
4.1.4 Water 4-17
4.1.4.1 Methods and Assumptions 4-19
4.1.4.2 Analysis of Alternatives 4-20
4.1.4.3 Conclusion 4-25
4.2 Mineral Resources 4-26
4.2.1 Locatable 4-26
4.2.1.1 Methods and Assumptions 4-26
4.2.1.2 Analysis of Alternatives 4-27
4.2.1.3 Conclusion 4-29
4.2.2 Leasable – Coal 4-29
4.2.2.1 Methods and Assumptions 4-30
4.2.2.2 Analysis of Alternatives 4-30
4.2.2.3 Conclusion 4-33
4.2.3 Leasable – Geothermal 4-33
4.2.4 Leasable – Oil and Gas 4-33
4.2.4.1 Methods and Assumptions 4-34
4.2.4.2 Analysis of Alternatives 4-34
4.2.4.3 Conclusion 4-43
4.2.5 Leasable – Other Solid Leasables 4-43
4.2.5.1 Methods and Assumptions 4-43
4.2.5.2 Analysis of Alternatives 4-44
4.2.5.3 Conclusion 4-45
4.2.6 Salable 4-45
4.2.6.1 Methods and Assumptions 4-45
4.2.6.2 Analysis of Alternatives 4-46
4.2.6.3 Conclusion 4-48
4.3 Fire Management and Ecology 4-50
4.3.1 Unplanned/Wildland Fire 4-50
4.3.1.1 Methods and Assumptions 4-50
4.3.1.2 Analysis of Alternatives 4-51
4.3.1.3 Conclusion 4-54
4.3.2 Planned/Prescribed Fire 4-54
4.3.2.1 Methods and Assumptions 4-54
4.3.2.2 Analysis of Alternatives 4-54
4.3.2.3 Conclusion 4-56
4.3.3 Rehabilitation 4-56
4.3.3.1 Methods and Assumptions 4-57
4.3.3.2 Analysis of Alternatives 4-57
4.3.3.3 Conclusion 4-57
4.4 Biological Resources 4-59
4.4.1 Vegetation – Forests, Woodlands, and Forest Products 4-62
4.4.1.1 Methods and Assumptions 4-62
4.4.1.2 Analysis of Alternatives 4-62
4.4.1.3 Conclusion 4-68

4.4.2 Vegetation – Grassland and Shrubland Communities 4-69
4.4.2.1 Methods and Assumptions 4-69
4.4.2.2 Analysis of Alternatives 4-70
4.4.2.3 Conclusion 4-78
4.4.3 Vegetation – Riparian and Wetland Communities 4-78
4.4.3.1 Methods and Assumptions 4-78
4.4.3.2 Analysis of Alternatives 4-79
4.4.3.3 Conclusion 4-86
4.4.4 Vegetation – Invasive, Nonnative Plant Species and Pest Control 4-86
4.4.4.1 Methods and Assumptions 4-87
4.4.4.2 Analysis of Alternatives 4-87
4.4.4.3 Conclusion 4-93
4.4.5 Fish and Wildlife Resources – Fish 4-93
4.4.5.1 Methods and Assumptions 4-94
4.4.5.2 Analysis of Alternatives 4-94
4.4.5.3 Conclusion 4-98
4.4.6 Fish and Wildlife Resources – Wildlife 4-98
4.4.6.1 Methods and Assumptions 4-99
4.4.6.2 Analysis of Alternatives 4-100
4.4.6.3 Conclusion 4-132
4.4.7 Special Status Species – Plants 4-133
4.4.7.1 Methods and Assumptions 4-133
4.4.7.2 Analysis of Alternatives 4-134
4.4.7.3 Conclusion 4-142
4.4.8 Special Status Species – Fish 4-143
4.4.8.1 Methods and Assumptions 4-143
4.4.8.2 Analysis of Alternatives 4-144
4.4.8.3 Conclusion 4-145
4.4.9 Special Status Species – Wildlife 4-147
4.4.9.1 Methods and Assumptions 4-147
4.4.9.2 Analysis of Alternatives 4-148
4.4.9.3 Conclusion 4-175
4.5 Heritage and Visual Resources 4-177
4.5.1 Cultural Resources 4-177
4.5.1.1 Methods and Assumptions 4-178
4.5.1.2 Analysis of Alternatives 4-178
4.5.1.3 Conclusion 4-185
4.5.2 Paleontological Resources 4-185
4.5.2.1 Methods and Assumptions 4-185
4.5.2.2 Analysis of Alternatives 4-186
4.5.2.3 Conclusion 4-190
4.5.3 Visual Resources 4-190
4.5.3.1 Methods and Assumptions 4-191
4.5.3.2 Analysis of Alternatives 4-191
4.5.3.3 Conclusion 4-194
4.6 Land Resources 4-196
4.6.1 Lands and Realty 4-196
4.6.1.1 Methods and Assumptions 4-196
4.6.1.2 Analysis of Alternatives 4-197
4.6.1.3 Conclusion 4-201
4.6.2 Renewable Energy 4-201
4.6.2.1 Methods and Assumptions 4-202
4.6.2.2 Analysis of Alternatives 4-202
4.6.2.3 Conclusion 4-204

4.6.3 Rights-of-Way and Corridors 4-205
4.6.3.1 Methods and Assumptions 4-205
4.6.3.2 Analysis of Alternatives 4-205
4.6.3.3 Conclusion 4-208
4.6.4 Transportation 4-208
4.6.4.1 Methods and Assumptions 4-208
4.6.4.2 Analysis of Alternatives 4-209
4.6.4.3 Conclusion 4-210
4.6.5 Off-Highway Vehicles 4-210
4.6.5.1 Methods and Assumptions 4-210
4.6.5.2 Analysis of Alternatives 4-211
4.6.5.3 Conclusion 4-214
4.6.6 Livestock Grazing 4-214
4.6.6.1 Methods and Assumptions 4-215
4.6.6.2 Analysis of Alternatives 4-215
4.6.6.3 Conclusion 4-224
4.6.7 Recreation 4-224
4.6.7.1 Methods and Assumptions 4-224
4.6.7.2 Analysis of Alternatives 4-225
4.6.7.3 Conclusion 4-232
4.7 Special Designations 4-233
4.7.1 Areas of Critical Environmental Concern and Special Management Areas 4-233
Jackson Canyon ACEC (Existing) 4-234
4.7.1.1 Methods and Assumptions 4-234
4.7.1.2 Analysis of Alternatives 4-234
4.7.1.3 Conclusion 4-236
Salt Creek Hazardous Area ACEC (Existing) 4-236
4.7.1.4 Methods and Assumptions 4-237
4.7.1.5 Analysis of Alternatives 4-237
4.7.1.6 Conclusion 4-238
Alcova Fossil Area ACEC/SMA (Proposed) 4-238
4.7.1.7 Methods and Assumptions 4-238
4.7.1.8 Analysis of Alternatives 4-238
4.7.1.9 Conclusion 4-240
Bates Hole SMA (Proposed) 4-241
4.7.1.10 Methods and Assumptions 4-241
4.7.1.11 Analysis of Alternatives 4-242
4.7.1.12 Conclusion 4-243
Black-tailed Prairie Dog ACEC (Proposed) 4-244
4.7.1.13 Methods and Assumptions 4-244
4.7.1.14 Analysis of Alternatives 4-244
4.7.1.15 Conclusion 4-246
Cedar Ridge Traditional Cultural Property ACEC/SMA (Proposed) 4-246
4.7.1.16 Methods and Assumptions 4-246
4.7.1.17 Analysis of Alternatives 4-246
4.7.1.18 Conclusion 4-249
North Platte River ACEC (Proposed) 4-250
4.7.1.19 Methods and Assumptions 4-250
4.7.1.20 Analysis of Alternatives 4-250
4.7.1.21 Conclusion 4-253
Salt Creek SMA (Proposed) 4-253
4.7.1.22 Methods and Assumptions 4-253
4.7.1.23 Analysis of Alternatives 4-253
4.7.1.24 Conclusion 4-254

Sand Hills SMA (Proposed) 4-254
4.7.1.25 Methods and Assumptions 4-254
4.7.1.26 Analysis of Alternatives 4-255
4.7.1.27 Conclusion 4-256
South Bighorns/Red Wall ACEC/SMA (Proposed) 4-256
4.7.1.28 Methods and Assumptions 4-257
4.7.1.29 Analysis of Alternatives 4-257
4.7.1.30 Conclusion 4-260
Wind River Basin SMA (Proposed) 4-260
4.7.1.31 Methods and Assumptions 4-261
4.7.1.32 Analysis of Alternatives 4-261
4.7.1.33 Conclusion 4-265
4.7.2 National Back Country Byways 4-265
4.7.2.1 Methods and Assumptions 4-266
4.7.2.2 Analysis of Alternatives 4-266
4.7.2.3 Conclusion 4-266
4.7.3 National Historic Trails and Other Historic Trails 4-266
4.7.3.1 Methods and Assumptions 4-267
4.7.3.2 Analysis of Alternatives 4-267
4.7.3.3 Conclusion 4-274
4.7.4 Wild and Scenic Rivers 4-275
4.7.4.1 Methods and Assumptions 4-275
4.7.4.2 Analysis of Alternatives 4-275
4.7.4.3 Conclusion 4-276
4.8 Socioeconomic Resources 4-277
4.8.1 Social Conditions 4-277
4.8.1.1 Methods and Assumptions 4-277
4.8.1.2 Analysis of Alternatives 4-278
4.8.1.3 Conclusion 4-283
4.8.2 Economic Conditions 4-284
4.8.2.1 Methods and Assumptions 4-284
4.8.2.2 Analysis of Alternatives 4-286
4.8.2.3 Conclusion 4-291
4.8.3 Health and Safety 4-292
Health and Safety – Abandoned Mine Lands 4-292
4.8.3.1 Methods and Assumptions 4-292
4.8.3.2 Analysis of Alternatives 4-292
4.8.3.3 Conclusion 4-292
Health and Safety – Formerly Used Defense Sites 4-292
4.8.3.4 Methods and Assumptions 4-292
4.8.3.5 Analysis of Alternatives 4-293
4.8.3.6 Conclusion 4-293
Health and Safety – Hazardous Materials and Waste 4-293
4.8.3.7 Methods and Assumptions 4-293
4.8.3.8 Analysis of Alternatives 4-294
4.8.3.9 Conclusion 4-294
4.8.4 Environmental Justice 4-294
4.8.4.1 Methods and Assumptions 4-294
4.8.4.2 Analysis of Alternatives 4-295
4.8.4.3 Conclusion 4-295
4.8.5 Tribal Treaty Rights 4-295
4.9 Cumulative Impacts 4-296
4.10 Irreversible and Irretrievable Commitment of Resources 4-309
4.11 Unavoidable Adverse Impacts 4-310
CHAPTER 5 REFERENCES 5-1
CHAPTER 6 LIST OF PREPARERS 6-1

LIST OF TABLES

Table 1-1. Acreage of Surface Land Within each Jurisdiction of the Casper Planning Area 1-3

Table 1-2. Acreage of Subsurface Mineral Ownership Within each Jurisdiction of the Casper Planning Area 1-3

Table 1-3. Plans Related to the Management of Land and Resources that Apply to the Casper Resource Management Plan Revision 1-13

Table 1-4. Meetings with Cooperating Agencies 1-15

Table 1-5. Public Involvement, Coordination, and Consultation Meetings (2003) 1-17

Table 2-1. Comparative Summary of Proposed Land Use Decisions for Physical, Biological, and Heritage Resources and Resource Uses and Support by Alternative in the Casper Planning Area 2-8

Table 2-2. Comparative Summary of Proposed Special Designations by Alternative for the Casper Planning Area 2-13

Table 2-3. Detailed Table of Alternatives 2-28

Table 2-4. Summary of Environmental Consequences by Alternative 2-102

Table 3-1. Summary of the Climate in the Casper Planning Area 3-4

Table 3-2. National Parks, Wilderness Areas, and National Monuments in the Vicinity of the Casper Planning Area 3-5

Table 3-3. Year 2001 Annual Emissions for BLM Activities within the Casper Planning Area 3-7

Table 3-4. Soils with High Erosion Potential in the Casper Planning Area 3-12

Table 3-5. Uses of Active Well Permits by County 3-15

Table 3-6. Water Use Summary for the Year 2000 for Counties Encompassing the Casper Planning Area 3-15

Table 3-7. Mined and Unmined Leasable Coal Areas (acres) 3-19

Table 3-8. Coal Development Potential for Northern Converse County (acres) 3-20

Table 3-9. Oil and Gas Producing Formations in the Casper Planning Area 3-22

Table 3-10. Well Statistics for Casper Planning Area as of February 24, 2005 3-23

Table 3-11. Field Statistics for Oil and Gas Production in the Casper Planning Area during 2004 3-25

Table 3-12. Summary of Oil and Gas Reserve Estimates for the Casper Planning Area 3-28

Table 3-13. Salable Mineral Production in the Casper Planning Area for FY 2003 3-30

Table 3-14. Annual Average Acreage of Planned and Unplanned Fires in Different Vegetative Types in the Casper Planning Area 3-31

Table 3-15. Vegetative Types and Acreage in the Casper Planning Area 3-37

Table 3-16. Distribution of Forests and Woodlands on BLM-Administered Land in the Casper Planning Area 3-37

Table 3-17. Classification and Condition of Riparian and Wetland Habitats on Public Land Surface in the Casper Planning Area 3-46

Table 3-18. Wyoming Weed and Pest Control Act Designated List 3-48

Table 3-19. Declared List of Weeds and Pests by Counties in the Casper Planning Area for 2005 3-49

Table 3-20. Habitat Management Plans for the Casper Planning Area 3-55

Table 3-21. Summary of Potential Number of Raptor and Nongame Bird Species in the Casper Planning Area 3-63

Table 3-22. Special Status Plant Species Known to or Potentially Occurring in the Casper Planning Area 3-70

Table 3-23. Special Status Wildlife Species in the Casper Planning Area 3-74
Table 3-24. Visual Resource Management Classes 3-90
Table 3-25. Existing Withdrawals, Classifications, and Other Segregations in the Casper Planning Area 3-96
Table 3-26. Wind-Energy Potential by Wind-Power Class 3-98
Table 3-27. Existing and Proposed Access Easements in the Casper Planning Area 3-101
Table 3-28. Livestock Grazing Leases on Lands Administered by the Casper Field Office 3-104
Table 3-29. The Type and Number of Range Improvement Projects in the Casper Planning Area 3-108
Table 3-30. Hunting and Fishing Recreation Days (1997 to 2001) 3-111
Table 3-31. Existing and Proposed ACECs and SMAs in the Casper Planning Area 3-113
Table 3-32. Casper Planning Area – List of Eligible Waterways 3-124
Table 3-33. Estimated Mineral Production and Value by County in the Casper Planning Area 3-129
Table 3-34. Personal Income by Source of Income in Natrona, Converse, Platte, and Goshen Counties, Wyoming, for the Year 2000 (percentage of total) 3-131
Table 3-35. Earnings and Employment for Mining Activities in Natrona and Converse Counties, Wyoming, for 2002 3-133
Table 3-36. Employment by Industry in Natrona, Converse, Platte, and Goshen Counties, Wyoming, for the year 2000 (Percentage of Total) 3-133
Table 3-37. 2003 Average Earnings Per Job by County 3-134
Table 3-38. Estimated State Severance Tax Collections in Natrona, Converse, Platte, and Goshen Counties, Wyoming, Production Year 2003 3-136
Table 3-39. Local and State Tax Receipts Due to Travel and Tourism in Wyoming, 2003 3-136
Table 3-40. Racial and Ethnic Groups for Casper Planning Area Counties, and Wyoming (Percent of Population in 2000)[1] 3-139
Table 4-1. Total Projected Surface Disturbance from BLM Reasonable Foreseeable Actions in the Casper Planning Area 4-3
Table 4-2. Total Annual Emissions Summary for BLM Activities within the Casper Planning Area 4-6
Table 4-3. Estimated Acres of Highly Erosive Soils That May be Impacted by Each Alternative 4-14
Table 4-4. Estimated Acres of Soils with a High Potential for Water Erosion by Alternative 4-23
Table 4-5. Total Acres of BLM Federal Mineral Estate Closed/Open to Oil and Gas Leasing by Alternative in the Casper Planning Area 4-36
Table 4-6. Acres of BLM Federal Mineral Estate Closed to Oil and Gas Leasing by Resource in the Casper Planning Area 4-36
Table 4-7. Projected BLM Federal Wells Drilled by Alternative through 2020 in the Casper Planning Area 4-38
Table 4-8. Reasonable Foreseeable Actions – Surface Disturbance Acres in the Casper Planning Area 4-101
Table 4-9. Summary of Select Conservation Measures and Potential Habitat Impacts for Wildlife 4-102
Table 4-10. BLM Actions and Potential Water Depletions in the North Platte Watershed During Implementation of the Casper Field Office Resource Management Plan 4-146
Table 4-11. Reasonable Foreseeable Actions – Surface Disturbance (Acres) in the Casper Planning Area 4-149
Table 4-12. Summary of Select Conservation Measures and Potential Habitat Impacts for Special Status Species – Wildlife 4-152

Table 4-13. Summary of Withdrawals, Classifications, and Other Segregations by Alternative (Acreage) 4-199
Table 4-14. Recreation Management Areas by Alternative 4-225
Table 4-15. Proposed and Existing ACECs/SMAs by Alternative 4-233
Table 4-16. Acres within the Wind River Special Management Area Established with CSU or NSO Restrictions for Greater Sage-Grouse Breeding and Nesting Habitats by Alternatives 4-263
Table 4-17. Acres of Crucial Winter Range within the Wind River Special Management Area by Alternative 4-264
Table 4-18. Overall Impacts on Social Conditions in the Casper Planning Area Alternative, Compared to the No Action Alternative 4-284
Table 4-19. Average Annual Impacts on Earnings and Output by Sector and Alternative for the Casper Planning Area 4-287
Table 4-20. Average Annual Impacts on Employment by Sector and Alternative for the Casper Planning Area 4-288
Table 4-21. Estimated Tax Revenues by Alternative for the Casper Planning Area 4-288
Table 4-22. Summary of Reasonably Foreseeable Future Actions 4-298
Table 4-23. Cumulative Surface Disturbance from BLM and Non-BLM Reasonable Foreseeable Actions over the Life of the Plan in the Casper Planning Area 4-300
Table 4-24. Cumulative Reasonable Foreseeable Actions for Surface Disturbance in the Casper Planning Area 4-302
Table 4-25. Reasonable Foreseeable Development Well Number Projections 4-303
Table 4-26. Projected Cumulative Annual Water Depletion from BLM and Non-BLM Actions over the Life of the Plan 4-304
Table 4-27. Contiguous Blocks of Native Habitat Identified in the Casper Planning Area to Avoid Habitat Fragmentation (acres) 4-305
Table 4-28. Cumulative (including state and private) Impacts of Oil and Gas Development over the Life of the Plan in the Casper Planning Area[1] 4-307
Table 4-29. Cumulative Annual Emissions for BLM Activities within the Casper Planning Area – Baseline Year 2001 4-312
Table 4-30. Cumulative Annual Emissions Associated with Alternative A 4-314
Table 4-31. Cumulative Annual Emissions Associated with Alternative B 4-317
Table 4-32. Cumulative Annual Emissions Associated with Alternative C 4-320
Table 4-33. Cumulative Annual Emissions Associated with Alternative D 4-323
Table 4-34. Cumulative Annual Emissions Associated with Alternative E (Preferred Alternative) 4-326

LIST OF FIGURES

Figure 1-1. Casper Field Office Planning Area 1-2
Figure 1-2. Nine-step Planning Process 1-7
Figure 2-1. Reasonable Range of Alternatives for the Casper Planning Area 2-1
Figure 3-1. Particulate Matter Concentrations in Casper, Wyoming 3-6
Figure 3-2. Annual Visibility (Standard Visual Range [SVR]) in the Bridger Wilderness Area 3-6
Figure 3-3. Mean Annual Wet Deposition near Pinedale, Wyoming 3-8

Figure 3-4. Mean Annual Dry Deposition near Pinedale, Wyoming 3-8
Figure 3-5. Coal Development Potential Area in Northern Converse County 3-19
Figure 3-6. WGFD Pronghorn Herd Units within the Casper Planning Area 3-57
Figure 3-7. WGFD Mule Deer Herd Units within the Casper Planning Area 3-58
Figure 3-8. WGFD Elk Herd Units within the Casper Planning Area 3-58
Figure 3-9. Population Trends in Natrona, Converse, Goshen, and Platte Counties, Wyoming, from 1970 to 2004 3-126
Figure 4-1. Project Emissions from BLM Activities within the Casper Planning Area: Year 2011 4-8
Figure 4-2. Project Emissions from BLM Activities within the Casper Planning Area: Year 2020 4-9

VOLUME 2
TABLE OF CONTENTS

APPENDICES

Appendix A	Split-Estate Lands
Appendix B	Federal Laws, Regulations, Policies, and Guidance Applicable to Each Resource Topic
Appendix C	Public Involvement, Consultation, and Coordination
Appendix D	Oil and Gas Operations
Appendix E	Biological Resources Support Document
Appendix F	Exception, Modification, and Waiver Criteria
Appendix G	Land Disposal
Appendix H	Areas Closed to Grazing
Appendix I	Wyoming Bureau of Land Management Mitigation Guidelines for Surface-Disturbing and Disruptive Activities
Appendix J	Technical Support Document for Air Quality
Appendix K	Best Management Practices
Appendix L	Air Quality Mitigation Matrix
Appendix M	Surface Disturbance and Reasonable Foreseeable Actions
Appendix N	Standard Oil and Gas Stipulations
Appendix O	Recreation Management Matrices
Appendix P	Area of Critical Environmental Concern Nomination Process
Appendix Q	Mineral Development Potential
Appendix R	Clarification of Off-Highway Vehicle Designations and Travel Management in the Bureau of Land Management Land Use Planning Process
Appendix S	Guidelines for Yearling Conversion
Appendix T	Stock Driveway Management Standards
Appendix U	Intensive Management
Appendix V	Economic Impact Analysis Methodology
Appendix W	Parcel Numbers and Legal Descriptions by Resource Program
Appendix X	Invasive, Nonnative Plant Species Best Preventative Management Practices and Mitigation Options

GLOSSARY

The glossary is included at the end of Volume 2 following Appendix X.

MAPS

Maps are included in electronic format. In hardcopy documents, maps can be found on a CD attached to the inside back cover of Volume 2. For CD versions of the document, maps are provided as a separate file on the CD.

Map 1 Surface Ownership within the Casper Field Office Planning Area
Map 2 Mineral Ownership within the Casper Field Office Planning Area
Map 3 Physical Resources Geologic Resources All Alternatives
Map 4 Physical Resources Soil All Alternatives
Map 5 Physical Resources Water All Alternatives
Map 6 Mineral Resources Leasable – Coal Alternative A
Map 7 Mineral Resources Leasable – Coal Alternatives B, C, D, and E (Preferred Alternative)
Map 8 Mineral Resources Leasable – Oil and Gas Alternative A
Map 9 Mineral Resources Leasable – Oil and Gas Alternative B
Map 10 Mineral Resources Leasable – Oil and Gas Alternative C
Map 11 Mineral Resources Leasable – Oil and Gas Alternative D
Map 12 Mineral Resources Leasable – Oil and Gas Alternative E (Preferred Alternative)
Map 13 Mineral Resources Locatable Alternative A
Map 14 Mineral Resources Locatable Alternative B
Map 15 Mineral Resources Locatable Alternative C
Map 16 Mineral Resources Locatable Alternative D
Map 17 Mineral Resources Locatable Alternative E (Preferred Alternative)
Map 18 Mineral Resources Salable All Alternatives
Map 19 Fire Management and Ecology All Alternatives
Map 20 Biological Resources Vegetation – Grasslands, Shrublands, and Riparian Areas All Alternatives
Map 21 Biological Resources Vegetation – Forests, Woodlands, and Forest Products All Alternatives
Map 22 Biological Resources Vegetation – Invasive Nonnative Plant Species All Alternatives
Map 23 Biological Resources Fish and Wildlife – Wildlife Alternatives A, C, D, and E (Preferred Alternative)
Map 24 Biological Resources Fish and Wildlife – Wildlife Alternative B
Map 25 Biological Resources Special Status Species – Plants All Alternatives
Map 26 Biological Resources Special Status Species – Wildlife Alternative A
Map 27 Biological Resources Special Status Species – Wildlife Alternative B
Map 28 Biological Resources Special Status Species – Wildlife Alternative C
Map 29 Biological Resources Special Status Species – Wildlife Alternative D
Map 30 Biological Resources Special Status Species – Wildlife Alternative E (Preferred Alternative)
Map 31 Heritage Resources Cultural All Alternatives
Map 32 Heritage Resources Visual Resource Management Alternative A
Map 33 Heritage Resources Visual Resource Management Alternative B

MAPS (Continued)

Map 34 Heritage Resources Visual Resource Management Alternative C
Map 35 Heritage Resources Visual Resource Management Alternative D
Map 36 Heritage Resources Visual Resource Management Alternative E (Preferred Alternative)
Map 37 Land Resources Lands and Realty – Retention and Disposal Alternative A
Map 38 Land Resources Lands and Realty – Retention and Disposal Alternative B
Map 39 Land Resources Lands and Realty – Retention and Disposal Alternative C
Map 40 Land Resources Lands and Realty – Retention and Disposal Alternatives D and E (Preferred Alternative)
Map 41 Land Resources Lands and Realty – Acquisition All Alternatives
Map 42 Land Resources Renewable Energy All Alternatives
Map 43 Land Resources Rights-of-Way and Corridors Alternative A
Map 44 Land Resources Rights-of-Way and Corridors Alternative B
Map 45 Land Resources Rights-of-Way and Corridors Alternative C
Map 46 Land Resources Rights-of-Way and Corridors Alternative D
Map 47 Land Resources Rights-of-Way and Corridors Alternative E (Preferred Alternative)
Map 48 Land Resources Transportation All Alternatives
Map 49 Land Resources Off-Highway Vehicles Alternative A
Map 50 Land Resources Off-Highway Vehicles Alternative B
Map 51 Land Resources Off-Highway Vehicles Alternative C
Map 52 Land Resources Off-Highway Vehicles Alternative D
Map 53 Land Resources Off-Highway Vehicles Alternative E (Preferred Alternative)
Map 54 Land Resources Livestock Grazing Alternatives A and B
Map 55 Land Resources Livestock Grazing Alternatives C and E (Preferred Alternative)
Map 56 Land Resources Livestock Grazing Alternative D
Map 57 Land Resources Recreation All Alternatives
Map 58 Special Designations Areas of Critical Environmental Concern and Special Management Areas Alternative A
Map 59 Special Designations Areas of Critical Environmental Concern and Special Management Areas Alternative B
Map 60 Special Designations Areas of Critical Environmental Concern and Special Management Areas Alternative C
Map 61 Special Designations Areas of Critical Environmental Concern and Special Management Areas Alternative D
Map 62 Special Designations Areas of Critical Environmental Concern and Special Management Areas Alternative E (Preferred Alternative)
Map 63 Special Designations National Back Country Byways All Alternatives
Map 64 Special Designations National Historic Trails Alternatives A, D, and E (Preferred Alternative)
Map 65 Special Designations National Historic Trails Alternative B
Map 66 Special Designations National Historic Trails Alternative C
Map 67 Socioeconomic Resources Health and Safety All Alternatives

This page intentionally left blank.

ACRONYMS AND ABBREVIATIONS

$\mu g/m^3$	micrograms per cubic meter
<	less than
>	greater than
§	Section
°F	degrees Fahrenheit
2-D	two-dimensional
3-D	three-dimensional
AA	Analysis Area
AAM	annual arithmetic mean
ACEC	Area of Critical Environmental Concern
ADA	Americans with Disabilities Act
ADMB	Animal Damage Management Board
AIRFA	American Indian Religious Freedom Act
AJE	annual job equivalents
AML	abandoned mine land
AMP	Allotment Management Plan
AMR	appropriate management response
ANS	Artificial Nesting Structure
APD	application for permit to drill
APE	Area of Potential Effect
APP	Avian Protection Plan
APHIS	Animal and Plant Health Inspection Service
AQD	Air Quality Division
AQRV	Air Quality Related Value
ARPA	Archaeological Resources Protection Act
ATV	all-terrain vehicle
AUM	animal unit month
BA	Biological Assessment
BACT	best available control technology
bbl	barrel
Bcf	billion cubic feet
BEA	Bureau of Economic Analysis
BLM	Bureau of Land Management
BMP	Best Management Practice
BMU	bear management unit
BTU	British Thermal Units
CAA	Clean Air Act
CAZ	conflict administration zone
CASTNet	Clean Air Status & Trends Network
CBNG	coalbed natural gas
CCC	Civilian Conservation Corps
CDPA	coal development potential area
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulation
cfs	cubic feet per second
C&MU	Classification and Multiple Use (Act of 1964)
CO	carbon monoxide
CO_2	carbon dioxide
COA	conditions of approval
CREG	Consensus Revenue Estimating Group
CRM	Coordinated Resource Management
CSMG	Casper Solid Minerals Group
CSU	controlled surface use
CWA	Clean Water Act
CWD	Chronic Wasting Disease
dB	decibel
D-C	Denver-Cheyenne Basin
DEQ	Department of Environmental Quality
DEQAML	Department of Environmental Quality Abandoned Land Mines
WSEO	Wyoming State Engineers Office
DFC	desired future conditions
DOE	U.S. Department of Energy
DOR	U.S. Department of Revenue
DPC	desired plant community
E	East
E&P	exploration and production
EA	Environmental Assessment
EEA	Environmental Education Area
EHD	Epizootic Hemorrhagic Disease
EIA	Energy Information Administration
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPCA	Energy Policy and Conservation Act
ERMA	Extensive Recreation Management Area
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FAMS	Facility Assessment Management System
FAR	functional at-risk
FEJF	Fire Emissions Joint Forum
FERC	Federal Energy Regulation Commission
FLPMA	Federal Land Policy and Management Act
FMA	Forest Management Area
FMP	Fire Management Plan
FOCRA	Federal Onshore Control and Reclamation Act
FS	Forest Service
FUDS	Formerly Used Defense Site
FY	Fiscal Year
G	Global rank: refers to the range-wide status of a species.
g	gram
GCVTC	Grand Canyon Visibility Transport Commission
GIS	Geographic Information System
GPS	Global Positioning System
GTI	Gas Technology Institute
H_2S	hydrogen sulfide
H_2SO_4	sulfuric acid
HA	Homestead Acts
HAP	hazardous air pollutant

ACRONYMS AND ABBREVIATIONS (Continued)

HAZMAT	hazardous materials
HFI	Healthy Forest Initiative
HFRA	Healthy Forests Restoration Act
HMP	Habitat Management Plan
HMRRP	Hazard Management and Resource Restoration Program
HNO_3	nitric acid
hp	horsepower
I-25	Interstate Highway 25
IB	Information Bulletin
IBLA	Interior Board of Land Appeals
ID	Interdisciplinary
IM	Instruction Memorandum
IMPLAN	Impact Analysis for Planning
IMPROVE	Interagency Monitoring of Protected Visual Environments
INPS	invasive nonnative plant species
IOGCC	Interstate Oil and Gas Compact Commission
KGS	known geologic structure
lb	pound
LAD	land application disposal
LBA	Lease by Application
LDA	limited to designated areas
LMU	lion management unit
MACT`	maximum achievable control technology
MBF	thousand board feet
mcf	thousand cubic feet
MFP	management framework plan
MLA	Mineral Leasing Act
MMB	million barrels
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
mph	miles per hour
MSA	Management Situation Analysis
msl	mean sea level
MW	megawatts
N	North
NAAQS	National Ambient Air Quality Standards
NADP	National Atmospheric Deposition Program
NAGPRA	Native American Graves Protection and Repatriation Act
NARO	North Antelope/Rochelle Mine
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NF	nonfunctional
NFP	National Fire Plan
NG	natural gas
NGL	natural gas liquids
NHPA	National Historic Preservation Act
NHS	National Historic Site
NHT	National Historic Trail
No.	Number
NO_2	nitrogen dioxide
NOA	Notice of Availability
NOI	Notice of Intent
NOS	Notice of Staking
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NSD	no surface disturbance
NSO	no surface occupancy
NSS	native species status
NTL	Notice to Lessee
NWA	National Wilderness Areas
O_3	ozone
OHV	off-highway vehicle
OSM	Office of Surface Mining
PFC	proper functioning condition
PGC	Potential Gas Committee
pH	potential of hydrogen
planning area	Casper Field Office planning area
PM	particulate matter
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PNC	potential natural community
POO	plan of operation
ppb	parts per billion
ppm	parts per million
PRP	potentially responsible party
PSD	prevention of significant deterioration
Pub. L.	Public Law
R	Range
R&PP	Recreation and Public Purposes (Act)
RAM	Risk Assessment and Mitigation (strategy)
RCRA	Resource Conservation and Recovery Act
RFA	Reasonable Foreseeable Action or Activity
RFD	Reasonably Foreseeable Development
RMP	Resource Management Plan
RMPPA	Resource Management Plan Planning Area
RMU	resource management units
RMZ	recreation management zone
ROD	Record of Decision
ROI	region of influence
ROW	rights-of-way
ROS	Recreational Opportunity Spectrum
RVD	recreation visitor day

ACRONYMS AND ABBREVIATIONS (Continued)

S	South
SARA	Superfund Amendments and Reauthorization Act
SO_2	sulfur dioxide
SD	Special Designation
SDW	stock driveway
Sec.	Section
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SMA	Special Management Area
SMCRA	Surface Mining Control and Reclamation Act
SO_x	sulfur oxides
SRHA	Stock Raising Homestead Act
SRMA	Special Recreation Management Area
SRP	Special Recreational Permits
Stat.	Statute
STATSGO	State Soil Geographic Database
SVR	Standard Visual Range
SWPPP	Storm Water Pollution Prevention Plan
T	Township
TCP	Traditional Cultural Property
TDS	Total Dissolved Solids
TLS	timing limitation stipulation
TPY	tons per year
TSD	technical support document
TSDF	Treatment, Storage, and Disposal Facilities
U.S.	United States
U.S.C.	United States Code
UIC	Underground Injection Control
URA	unit resource analysis
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
VRM	visual resource management
vs.	versus
W	West
WAAQS	Wyoming Ambient Air Quality Standards
WAG	water and gas
WAQSR	Wyoming Air Quality Standards and Regulations
WGFD	Wyoming Game and Fish Department
WMA	wildlife management area
WOGCC	Wyoming Oil and Gas Conservation Commission
WRAP	Western Regional Air Partnership
WSFD	Wyoming State Forestry Division
WSGS	Wyoming State Geological Survey
WSA	Wilderness Study Area
WSR	Wild and Scenic River
WUG	Western Utility Group
WUI	wildland-urban interface
WY	Wyoming
WYDOR	Wyoming Department of Revenue
WYDOT	Wyoming Department of Transportation
WYNDD	Wyoming Natural Diversity Database
WYNPDES	Wyoming National Pollutant Discharge Elimination System
WYPDES	Wyoming Pollutant Discharge Elimination System

This page intentionally left blank.

EXECUTIVE SUMMARY

INTRODUCTION

This Draft Environmental Impact Statement (EIS) analyzes the proposed action to revise the existing Platte River land use plan (i.e., Resource Management Plan [RMP]) for the Casper, Wyoming, planning area. The Federal Land Policy and Management Act (FLPMA) requires developing, maintaining, and, as appropriate, revising land use plans for public lands. The purpose, or goal, of the land use plan is to ensure lands administered by the Bureau of Land Management (BLM) are managed in accordance with the FLPMA and the principles of multiple use and sustained yield.

Revising an existing land use plan is a major federal action for the BLM. The National Environmental Policy Act of 1969, as amended, requires federal agencies to prepare an EIS for major federal actions; thus, this Draft EIS/RMP is a combined document. The Draft EIS analyzes the impacts of five alternative RMPs for the planning area, including the No Action Alternative and agency Preferred Alternative. The No Action Alternative reflects current management (the existing plan). Formerly referred to as the Platte River Resource Area, the revised plan currently is titled and referred to as the Casper RMP.

PURPOSE AND NEED

Within the Casper planning area, the BLM manages approximately 1.4-million acres of BLM-administered public land surface and 4.7-million acres of federal mineral estate. Since 1985, the existing plan has served as the framework for managing these BLM-administered lands; however, the existing plan has undergone more than 50 maintenance actions, including updates and amendments, and is in need of revision. In the 20 years since the Record of Decision (ROD) was signed in July 1985 for the existing plan, new data have become available, new policies established, and old policies revised. This, along with emerging issues and changing circumstances, resulted in the need for revision. This new version will address the changing needs of the planning area and select a management strategy that best achieves a combination of the following:

- Employing a community-based planning approach and complying with applicable tribal, federal, and state laws, standards, and implementation plans, as well as BLM policies and regulations
- Establishing goals and objectives (desired outcomes) for managing resources and resource uses according to the principles of multiple use and sustained yield
- Identifying land use plan decisions to guide future land-management actions and subsequent site-specific implementation decisions
- Identifying management actions and allowable uses anticipated to achieve the established goals and objectives and reach desired outcomes
- Providing comprehensive management direction by making land use decisions for all appropriate resources and resource uses administered by the BLM Casper Field Office
- Recognizing the Nation's needs for domestic sources of minerals, food, timber, and fiber, and incorporating requirements of the Energy Policy and Conservation Act Reauthorization, the Energy Policy Act, the National Fire Plan, the Healthy Forest Restoration Act (USC 2003), and the Healthy Forest Initiative.
- Retaining flexibility to adapt to new and emerging issues and opportunities and providing for adjustments to decisions over time based on new information and monitoring
- Striving to be compatible with existing plans and policies of adjacent local, state, tribal, and federal agencies and consistent with federal law, regulations, and BLM policy.

PLANNING ISSUES AND CRITERIA

Planning issues identified through the scoping process and other public outreach efforts focus on conflicts among resources and resource uses. Major issues described and analyzed in the EIS include the following:

Energy and Mineral Resources

- What areas are suitable or not suitable for energy and mineral resource development?
- What level of development should be allowed in areas suitable for energy and mineral resource development?

Vegetation and Habitat Management

- How should soil, water, and vegetation be managed to reduce fuel loads, achieve forest health and healthy rangelands while providing for livestock grazing and fish and wildlife habitat?
- How should special status species conservation strategies be applied given BLM's requirement for multiple use management and sustained yield? How will these strategies affect other public land resources?

Land Ownership Adjustments, Access and Transportation

- What land adjustments are necessary to improve access and management of public lands?
- How should travel be managed to provide access for recreation, commercial uses, and general enjoyment of the public lands while protecting cultural and natural resources?

Special Designations

- What areas, if any, contain unique or sensitive resources requiring special management?

Planning criteria are the standards, rules, and guidelines that help direct the RMP planning process. In conjunction with planning issues, planning criteria ensure the planning process is focused and incorporates appropriate analyses. Planning criteria for the Casper RMP revision also apply to development of the final RMP and are summarized below.

- Address all BLM-administered public lands in the planning area.
- Recognize valid existing rights.
- Comply with the Federal Land Policy and Management Act, National Environmental Policy Act, and all applicable laws, regulations, policy, and guidance.
- Be collaborative and multi-jurisdictional in nature and complementary to BLM's planning jurisdictions and adjoining properties within the boundaries described by law and regulation.
- Consider a reasonable range of alternatives that reflects the principles of multiple use and sustained yield.
- Consider current scientific information, research, new technologies, and the results of resource assessments, monitoring, and coordination.
- Apply the Wyoming Standards for Healthy Rangelands to all activities and provide for public safety and welfare relative to fire, hazardous materials, and abandoned mine lands.
- Consider current and potential future uses of the public lands through the development of reasonable foreseeable future development and activity scenarios based on historical, existing, and projected levels of use.
- Coordinate with tribes to identify sites, areas, and objects important to their cultural and religious heritages.

OVERVIEW OF ALTERNATIVES

The BLM conducted a series of workshops with an Interdisciplinary (ID) Team comprising BLM specialists and local, state, and federal cooperating agencies. The BLM formulated three alternatives (B, C, and D) reflecting a range of resource use and conservation. Following analysis of these three alternatives, the ID Team provided recommendations for selecting the Preferred Alternative—Alternative E. The Preferred Alternative indicates the agency's preliminary preference at this stage in the planning process and does not represent a final BLM decision.

Including the No Action Alternative (Alternative A), the five alternatives analyzed in this Draft EIS represent differing approaches to managing resources and resource uses in the planning area. Each alternative comprises two categories of land use planning decisions: (1) desired outcomes (goals and objectives) and (2) allowable uses and management actions.

Goals and objectives provide overarching direction for BLM actions in meeting the agency's legal, regulatory, policy, and strategic requirements. Goals are broad statements of desired outcome, but generally are unmeasurable. Objectives are more specific statements of a desired outcome that may include a measurable component. Objectives generally are anticipated to achieve the stated goals.

Allowable uses and management actions are anticipated to achieve the desired outcomes (goals and objectives). Management actions are proactive measures or limitations intended to guide BLM activities in the planning area. Allowable uses are a category of land use decisions that identify where specific land uses are allowed, restricted, or prohibited on BLM-administered surface lands and federal mineral estate in the planning area. Alternatives may include specific management actions to meet goals and objectives and may exclude certain land uses to protect resource values.

For each alternative, the BLM predicted actions and associated surface disturbance acreage for each resource over the life of the plan. For example, for livestock grazing, the BLM predicted the number of infrastructure developments (e.g., springs, wells, pits, reservoirs, fences, and pipelines) and estimated surface disturbance acreage for each alternative. For oil and gas, the BLM predicted the number of wells and estimated acres of surface disturbance for each alternative, as well as for the unconstrained (baseline) scenario. These predicted actions, allowable uses, and management actions form the basis for the impact analysis of alternatives described in Chapter 4. The four Action Alternatives and the No Action Alternative are described in detail in Chapter 2 and summarized in the following section.

Alternative A (No Action Alternative)

The No Action Alternative represents a continuation of current management and provides a baseline from which to identify potential environmental consequences when compared to the Action Alternatives. The No Action Alternative describes current resource and land management direction as represented in the 1985 Platte River Resource Area (existing plan) and associated maintenance actions, updates, and amendments. The current designation of two Areas of Crictical Environmental Concern (ACECs) (Jackson Canyon and Salt Creek Hazardous Area) does not change and no Special Management Areas (SMAs) are identified if the No Action Alternative is selected. Current management does not actively address habitat fragmentation in the planning area and generally addresses resource conflicts on a case-by-case basis. The No Action Alternative results in no revision to the existing plan at this time and does not meet the purpose and need of the proposed action.

Alternative B

Alternative B emphasizes conservation of physical, biological, and heritage resources with major constraints on resource uses. Relative to all alternatives, Alternative B conserves the most land area for physical, biological, and heritage resources and places the most restrictions on resource uses. For example, Alternative B designates the highest number of ACECs (seven); manages the largest area of

intact, contiguous blocks of native vegetation to minimize habitat fragmentation; includes the most restrictions on activities relative to protecting highly erosive soils; and is the most restrictive to off-highway vehicle (OHV) use, livestock grazing, wind-energy development, and leasing for oil and gas and other solid leasable minerals. Alternative B also establishes the Bates Hole SMA, with an emphasis on the greater sage-grouse and watershed values, and the Sand Hills SMA, with an emphasis on sensitive soils.

Alternative C

Alternative C provides physical, biological, and heritage resource conservation similar to current management but with additional restrictions. Alternative C generally falls between alternatives B and D relative to conservation of physical, biological, and heritage resources and restrictions on resource uses. Alternative C designates five ACECs and establishes the most SMAs (six). Two of the SMAs (Salt Creek and Wind River Basin) have an emphasis of oil and gas development. However, Alternative C establishes the most acreage for the proposed South Bighorns/Red Wall SMA and includes management of intact, contiguous blocks of native vegetation, although over a smaller area than Alternative B. Relative to current management of highly erosive soils, Alternative C also places more restrictions on OHV use, livestock grazing, wind-energy and ROW development, and leasing for oil and gas and other solid leasable minerals.

Alternative D

Alternative D emphasizes resource uses (e.g., energy and minerals, grazing, recreation, and forest products) while lessening some resource conservation measures relative to current management. Alternative D retains the existing Jackson Canyon ACEC, eliminates the Salt Creek Hazardous ACEC, establishes two SMAs (Salt Creek and Wind River Basin) with an emphasis on oil and gas development, and establishes one SMA (Alcova Fossil Area) for paleontological resources. Alternative D does not manage intact, contiguous blocks of native vegetation to minimize habitat fragmentation and conserves the least land area for physical, biological, and heritage resources relative to all alternatives. Relative to current management, Alternative D reduces restrictions on OHV use, livestock grazing, and leasing for oil and gas and other solid leasable minerals.

Alternative E (Preferred Alternative)

At this stage in the planning process, Alternative E is the BLM's Preferred Alternative because it reflects the best combination of decisions to achieve BLM goals and policies, meet the purpose and need, address the major planning issues, and consider the recommendations of cooperating agencies and BLM specialists.

Alternative E retains the existing Jackson Canyon ACEC, eliminates the Salt Creek Hazardous ACEC, and establishes the Alcova Fossil Area ACEC for paleontological resources. Alternative E also establishes three SMAs (Bates Hole, Sand Hills, and South Bighorns/Red Wall) with an emphasis on resource conservation and two SMAs (Salt Creek and Wind River Basin) with an emphasis on oil and gas development. Alternative E manages intact, contiguous blocks of native vegetation to minimize habitat fragmentation, although over a smaller area than alternatives B or C. Relative to current management, Alternative E places more restrictions on OHV use, livestock grazing, wind-energy development, and leasing for oil and gas and other solid leasable minerals.

In addition to the five alternatives analyzed in this Draft EIS, several alternatives were considered but not carried forward for detailed analysis because they:

1. Did not fulfill requirements of FLPMA or other existing laws or regulations
2. Did not meet the purpose and need

3. Were already part of an existing plan, policy, requirement, or administrative function
4. Did not fall within the limits of the planning criteria.

ENVIRONMENTAL CONSEQUENCES

Environmental consequences potentially resulting from each of the five alternatives were analyzed relative to meaningful direct, indirect, short-term, and long-term impacts. The impacts of each alternative are summarized in Table 2-4 and described in more detail in Chapter 4. Also included in Chapter 4 is a discussion of cumulative impacts that could result from the incremental impact of each alternative when added to other past, present, and reasonably foreseeable future actions.

COOPERATING AGENCIES

As the lead federal agency for the RMP revision, the BLM invited local, state, and federal agencies to participate as cooperating agencies. Converse, Natrona, and Platte County Commissioners, as well as five local conservation districts, agreed to participate as cooperating agencies in the RMP revision. The State of Wyoming, the U.S. Environmental Protection Agency, and the National Park Service are cooperating agencies as well. To date, the BLM and cooperating agencies have participated in three workshops to formulate alternatives and multiple meetings to keep cooperating agencies informed and to solicit their input. Comments from cooperating agencies on previous administrative drafts were considered in development of this Draft EIS.

COORDINATION WITH NATIVE AMERICANS

The BLM also invited tribes to participate as cooperating agencies and conducted ongoing coordination throughout the RMP revision process. Coordination included four letters, multiple phone calls, and face-to-face meetings with interested tribe representatives to identify places and issues of concern regarding the RMP revision.

PUBLIC INVOLVEMENT

The BLM issued a Notice of Intent (NOI), on June 20, 2003, indicating a revision of the existing plan and preparation of this EIS. Issuance of the NOI initiated a 5-month scoping period to solicit input from the public and interested agencies on the nature and extent of issues and impacts to be addressed in the Draft EIS. The BLM conducted four public scoping meetings in Wheatland, Torrington, Douglas, and Casper, Wyoming, during the 5-month scoping period to identify planning issues and introduce the public to the project and preliminary planning criteria. The BLM also established a project web site (http://www.blm.gov/rmp/casper) to keep the public informed about the RMP revision and to provide an ongoing method for public comment.

THE NEXT STEPS

This Draft EIS, now issued, provides 90 days for public comment. A series of four public hearings on this Draft EIS are scheduled during the 90-day comment period in Wheatland, Torrington, Douglas, and Casper, Wyoming. Following the 90-day public comment period, the BLM will prepare a Final EIS considering comments submitted. The Final EIS/Proposed RMP is scheduled for release in the summer of 2007 with a ROD scheduled for late 2007.

READER'S GUIDE TO THIS DOCUMENT

Volume 1

Chapter 1. Purpose and Need for Action. This chapter introduces the Draft EIS, describes the purpose and need to which BLM is responding, provides an overview of the BLM planning process, identifies planning issues and criteria, summarizes consultation and coordination, and identifies topics not addressed by this RMP revision.

Chapter 2. Resource Management Alternatives. Chapter 2 describes how the five alternatives (A through E) were developed, the components and content of each alternative, and discusses the alternatives considered but eliminated from further consideration. It also presents a comparative summary of impacts of each alternative. Resource discussions in chapters 2, 3, and 4 are organized according to the following eight resource topics:

Reader's Guide

Volume 1
Chapter 1 – Purpose and Need for Action
Chapter 2 – Resource Management Alternatives
Chapter 3 – Affected Environment
Chapter 4 – Environmental Consequences
Chapter 5 – References
Chapter 6 – List of Preparers

Volume 2
Appendices
Glossary
Maps

1000 Physical Resources—Air, Geology, Soil, and Water

2000 Mineral Resources—Locatable, Leasable, and Salable Minerals

3000 Fire Management and Ecology—Unplanned/Wildland Fire, Planned/Prescribed Fire, and Rehabilitation

4000 Biological Resources—Vegetation, Fish and Wildlife, and Special Status Species

5000 Heritage and Visual Resources—Cultural, Paleontological, and Visual

6000 Land Resources—Lands and Realty, Renewable Energy, ROW and Corridors, Transportation, OHV, Livestock Grazing, and Recreation

7000 Special Designations—ACECs, SMAs, National Back Country Byways, and NHTs and Other Historic Trails

8000 Socioeconomic Resources—Social and Economic Conditions, Health and Safety, Environmental Justice, and Tribal Treaty Rights.

Chapter 3. Affected Environment. This chapter describes the Casper planning area and the existing environmental conditions that could be impacted by the alternatives.

Chapter 4. Environmental Consequences. Chapter 4 forms the scientific and analytic basis for comparing environmental impacts of each alternative, including the No Action Alternative. Impacts generally are described in terms of direct or indirect and short-term or long-term, when applicable. Potential cumulative and unavoidable impacts and irreversible and irretrievable commitments also are discussed in this chapter.

Chapter 5. References. This chapter provides full citation information for all references cited within the document.

Chapter 6. List of Preparers. Chapter 6 presents the names and qualifications of the people responsible for preparing this EIS.

Volume 2

Appendices. The appendices include documents that support existing resource conditions or situations, substantiate analyses, provide resource management guidance, explain processes, or provide information directly relevant or supporting conclusions in the RMP revision. Twenty-four appendices, labeled Appendix A through Appendix X, are included.

Glossary. The glossary defines select terms used throughout this document.

Maps. Maps depict the alternatives by resource. In hardcopy documents, maps can be found on a CD attached to the inside back cover of Volume 2. For CD versions of the document, maps are provided as a separate file on the CD. Electronic copies of the maps are also available on the RMP web site (http://www.blm.gov/rmp/casper).

This page intentionally left blank.

CHAPTER 1
PURPOSE AND NEED FOR ACTION

Roadmap to Chapter 1

A roadmap is provided at the beginning of each chapter. These diagrams are intended to serve as a quick-reference guide for the reader.

1.1 Introduction and Background (Page 1-1)

- Historical Overview
- Land Ownership Within the Casper Field Office Planning Area

1.2 Purpose and Need for the Resource Management Plan Revision (Page 1-4)

- Purpose
- Need for Revising the Existing Plan

1.3 Planning Process (Page 1-7)

- Nine-Step Planning Process
- Resource Management Plan Implementation

1.4 Decision Framework (Page 1-9)

- Planning Issues
- Planning Criteria
- Relevant Statutes, Limitations, and Guidelines
- Other Related Plans

1.5 Consultation and Coordination (Page 1-13)

- Consultation and Coordination
- Public Involvement

1.6 Topics Not Addressed in This Resource Management Plan Revision (Page 1-23)

CHAPTER 1
PURPOSE AND NEED FOR ACTION

1.1 Introduction and Background

This Draft Resource Management Plan (RMP) and Environmental Impact Statement (EIS) describes and analyzes alternatives for the future management of public lands and resources administered by the Bureau of Land Management (BLM), Casper Field Office. The administrative area is located in east central Wyoming and includes approximately 8.5-million acres of land in most of Natrona County, and all of Converse, Platte, and Goshen counties (Figure 1-1). The BLM's Lander Field Office administers public lands in the southwestern corner of Natrona County. Within the Casper administrative area, the BLM manages approximately 1.4-million acres of BLM-administered public land surface and 4.7-million acres of mineral estate. Current management follows the 1985 Platte River RMP (existing plan) (BLM 1985a). The existing plan has undergone more than 50 maintenance actions including updates and amendments. To reflect changes in administrative units, the revised plan is titled and referred to as the "Casper RMP." This Draft RMP/EIS is referred to as an EIS in this document.

The Casper Field Office Administers 1,361,577 Surface Acres and 4,657,172 Acres of Mineral Estate

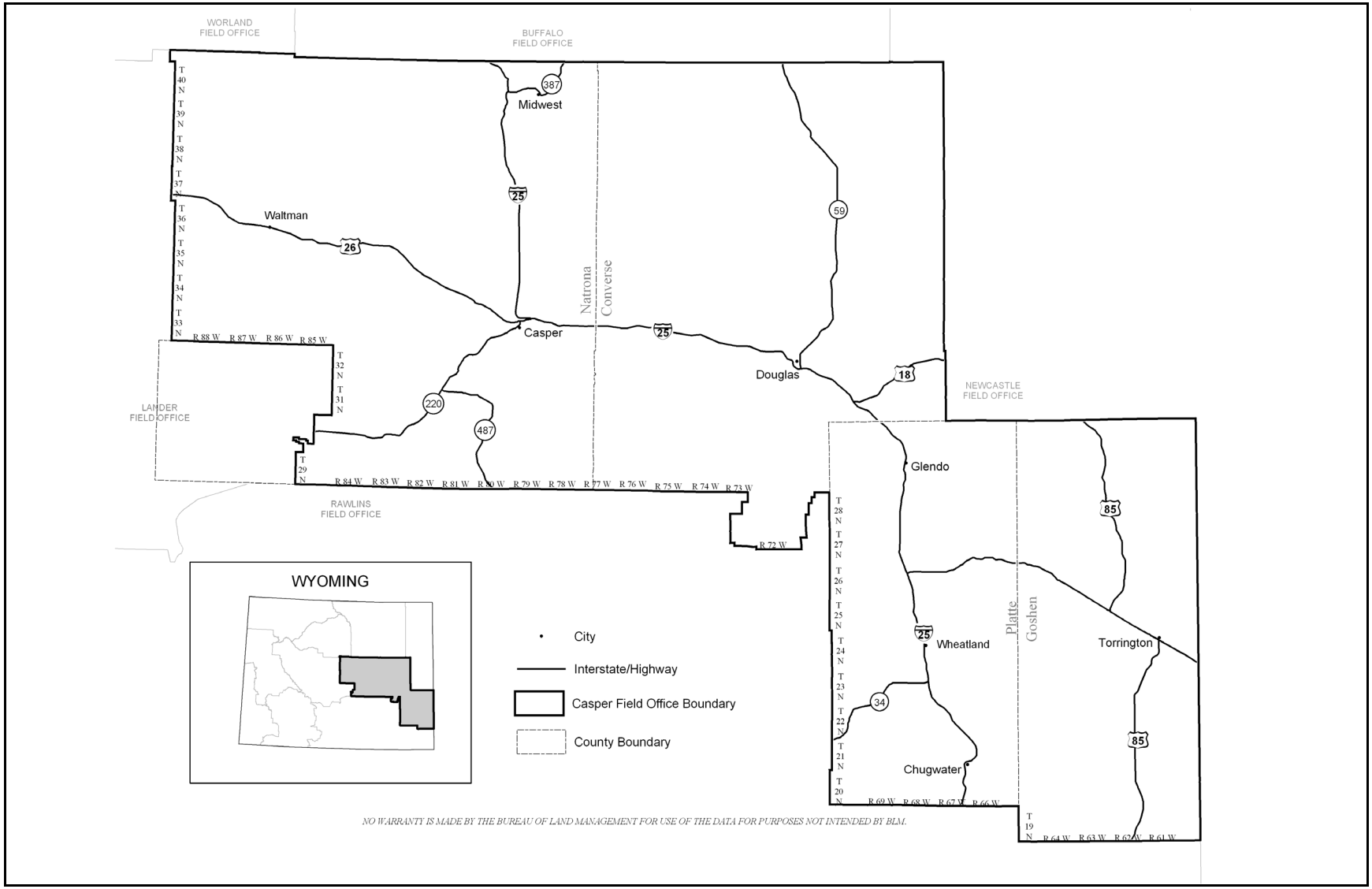
County	BLM Surface	BLM Mineral Estate
Natrona	1,124,485	2,362,582
Converse	129,947	1,619,626
Platte	81,965	422,602
Goshen	25,180	252,362

1.1.1 Historical Overview

In 1946, the U.S. Grazing Service merged with the General Land Office to form the BLM. The foundation for the BLM dates back to the Land Ordinance of 1785, which established the public domain and led to the creation of the General Land Office. The Northwest Ordinance of 1787 instituted the survey and settlement of lands ceded from the 13 colonies to the federal government and lands later acquired by the government from other countries. While the Nation's westward expansion progressed and the land base expanded, the settlement of western lands was encouraged through the enactment of a variety of laws, including the Homestead acts and the Mining Law of 1872. Over time, the luring of pioneers to settle the west became less necessary and the commercial value of these lands increased. A variety of statutes established to manage mineral, timber, or livestock foraging activities on public lands followed. For example, the Mineral Leasing Act of 1920 allowed leasing, exploration, and production of selected commodities, such as coal, oil, gas, and sodium, on public lands. Another example is the Taylor Grazing Act of 1934, which provided for management of the public rangelands.

After passage of the Federal Land Policy and Management Act of 1976 (FLPMA), BLM-administered lands were managed according to the principles of multiple use and sustained yield. Since 1976, the BLM has managed for multiple use and to balance increasing and competing demands for resources on public lands.

Figure 1-1. Casper Field Office Planning Area



1.1.2 Land Ownership Within the Casper Field Office Planning Area

As defined by FLPMA, "… public lands means any land and interest in land owned by the United States within the several States and administered by the Secretary of the Interior through the Bureau of Land Management…" The U.S. Department of the Interior (USDI) BLM Casper Field Office is responsible for managing most public lands in Converse, Goshen, Natrona, and Platte counties, Wyoming. County governments have land use planning responsibility for the private lands located within their jurisdictions.

Except for Natrona County, most of the BLM-administered surface land in the planning area is in scattered tracts intermingled with state and private lands. Throughout the planning area, there are also intermingled mineral ownerships, as well as federal minerals under privately owned surface, usually referred to as split-estate land. The scattered surface land pattern and varied mineral ownerships, along with split-estate lands, strongly impact management options. Appendix A provides details regarding split-estate lands and the BLM's administrative responsibilities for managing the federal minerals. Tables 1-1 and 1-2 contain summaries of the surface and mineral ownership and administrative relationships for the planning area. The approved RMP will not include planning and management decisions for (1) lands or minerals privately owned or owned by the State of Wyoming or local governments or (2) lands and minerals administered by other federal agencies (see Maps 1 and 2 in Volume 2).

Table 1-1. Acreage of Surface Land Within each Jurisdiction of the Casper Planning Area

Agency	Converse County	Goshen County	Natrona County	Platte County	Total
Bureau of Land Management	129,947	25,180	1,124,485	81,965	1,361,577
U.S. Bureau of Reclamation	158	282	7,034	10,604	18,078
Department of Defense	0	0	9,323	30,722	40,045
National Park Service	0	795	0	0	795
State of Wyoming	255,709	88,051	363,916	130,482	838,158
U.S. Fish and Wildlife Service	0	0	7,458	0	7,458
U.S. Department of Agriculture (USDA)-Forest Service	174,073	0	5,521	1,172	180,766
Other federal agencies	0	81	0	0	81
Other (water and private lands)	2,103,619	1,313,003	1,499,025	1,094,398	6,010,045
Bankhead Jones Act (USDA)	64,344	0	0	0	64,344
Total	**2,727,850**	**1,427,392**	**3,016,762**	**1,349,343**	**8,521,347**

Source: BLM 2005a
USDA United States Department of Agriculture

Table 1-2. Acreage of Subsurface Mineral Ownership Within each Jurisdiction of the Casper Planning Area

Agency	Mineral Ownership				
	Converse County	Goshen County	Natrona County	Platte County	Total
Bureau of Land Management	1,619,626	252,362	2,362,582	422,602	4,657,172
Other (state, federal, and private)	1,108,224	1,175,030	654,180	926,741	3,864,175
Total	**2,727,850**	**1,427,392**	**3,016,762**	**1,349,343**	**8,521,347**

Source: BLM 2005a

1.2 Purpose and Need for the Resource Management Plan Revision

Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulation [CFR] 1502.13) require the purpose and need of an EIS to "briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." The purpose and need section of this EIS provides a context and framework for establishing and evaluating the reasonable range of alternatives described in Chapter 2.

1.2.1 Purpose

Section 102 of the FLPMA sets forth the policy for periodically projecting the present and future use of public lands and their resources using the land use planning process. Sections 201 and 202 of the FLPMA establish the BLM's land use planning requirements. BLM Handbook H-1601-1, *Land Use Planning Handbook*, provides guidance for implementing the BLM land use planning requirements established by Sections 201 and 202 of the FLPMA and the regulations in 43 CFR 1600 (BLM 2005b).

The purpose, or goal, of the land use plan is to ensure BLM-administered lands are managed in accordance with the FLPMA and the principles of multiple use and sustained yield. The purpose of revising the existing plan is to address the growing needs of the planning area and to select a management strategy that best achieves a combination of the following:

- Employ a community-based planning approach to collaborate with federal, state, and local cooperating agencies
- Establish goals and objectives (desired outcomes) for management of resources and resource uses within the approximately 1.4-million surface acres and 4.7-million acres of federal mineral estate administered by the BLM Casper Field Office in accordance with the principles of multiple use and sustained yield
- Identify land use plan decisions to guide future land-management actions and subsequent site-specific implementation decisions
- Identify management actions and allowable uses anticipated to achieve the established goals and objectives and reach desired outcomes

The purpose of the land use plan is to ensure that BLM-administered lands are managed in accordance with FLPMA and the principles of multiple use and sustained yield.

- Provide comprehensive management direction by making land use decisions for all appropriate resources and resource uses administered by the BLM Casper Field Office
- Provide for compliance with applicable tribal, federal, and state laws, standards, implementation plans, and BLM policies and regulations
- Recognize the Nation's needs for domestic sources of minerals, food, timber, and fiber, and incorporate requirements of the Energy Policy and Conservation Act (EPCA) Reauthorization of 2000
- Retain flexibility to adapt to new and emerging issues and opportunities and to provide for adjustments to decisions over time based on new information and monitoring
- Strive to be compatible with existing plans and policies of adjacent local, state, tribal, and federal agencies and consistent with federal law, regulations, and BLM policy.

1.2.2 Need for Revising the Existing Plan

BLM identified the need, or requirement, to revise the existing plan through a formal evaluation of the existing plan (BLM 2000a), consideration of the Management Situation Analysis (MSA) (BLM 2005c), examination of issues identified during the public scoping process and through collaboration with cooperating local, state, and federal agencies. In the 20 years since the Record of Decision (ROD) was signed (July 1985) for the existing plan, new data have become available, new policies have been established, and old policies have been revised. This, along with emerging issues and changing circumstances, resulted in the need to revise the existing plan. In addition, the existing plan's decisions no longer serve as a useful guide for resource management in the Casper planning area. For example, the EPCA Reauthorization of 2000, coupled with the Nation's growing demand for domestic energy, resulted in different priorities than were foreseen when the existing plan was established in 1985. These and other select examples of new data, new and revised policies, and emerging issues and changing circumstances demonstrate the need to revise the existing plan.

Specifically, the existing plan's decisions no longer serve as a useful guide for resource management in the Casper planning area, and hence, the need to revise the existing plan.

New Data

Monitoring, availability of new information, and advances in science and technology provide new data to consider in the revision of the existing plan. Select new data can be found in the following documents and sources:

- BLM Assessing the Potential for Renewable Energy on Public Lands (BLM 2003e)
- BLM Buffalo Field Office Resource Management Plan (BLM 2001a)
- BLM Evaluation of the Platte River RMP (BLM 2000a)
- BLM Mineral Occurrence and Development Potential Report (BLM 2004c)
- BLM MSA (BLM 2005c)
- BLM Wyoming Statewide Biological Assessments for Species Regulated by the Endangered Species Act (ESA) (published between 2004 and 2005)
- Cultural Class I Regional Overview (BLM 2004g)
- Designation of Critical Habitat for Preble's Meadow Jumping Mouse and Colorado Butterfly Plant (USFWS 2003c; USFWS 2003c)
- EPCA Scientific Inventory of Onshore Federal Lands Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to their Development (USDI 2003)
- Preliminary Final Reasonable Foreseeable Development (RFD) Scenario for Oil and Gas, Casper Field Office (BLM 2005f)
- Programmatic EIS on Wind Energy Development on BLM-Administered Lands in the Western United States (BLM 2005h)
- U.S. Bureau of Reclamation (USBR) and U.S. Fish and Wildlife Service (USFWS) Draft EIS Platte River Recovery Implementation Program (USBR and USFWS 2003)
- Visual Resource Inventory (BLM 2004h)

- Wyoming Greater Sage-Grouse Conservation Plan (Wyoming Sage Grouse Working Group 2003) and Conservation Assessment of Greater Sage-Grouse and Sagebrush Habitats (Connelly et al. 2004).

New and Revised Policies

Numerous policies either have been revised or developed since the ROD for the existing plan was signed in 1985. Some of the more important and relevant policy changes since 1985 to consider when revising the existing plan include the following:

- BLM National Management Strategy for Motorized Off-Highway Vehicle (OHV) Use on Public Lands (BLM 2001b)
- BLM Instruction Memoranda (IM), including, but not limited to
  - Washington Office IM-2002-034 – Guidance on Fire Management, Prescribed Fire, and National Fire Plan (BLM 2002a)
  - Washington Office IM-2002-196 – Additional Guidance on Right-of-Way Management in Land Use Planning (BLM 2002b)
  - Washington Office IM-2003-137 – Guidance on Integrating the Energy Policy Conservation Act Inventories into Land Use Planning (BLM 2003a)
  - Washington Office IM-2005-024 – National Sage-Grouse Habitat Conservation Strategy (BLM 2005i)
  - Washington Office IM-2006-073 – Weed-Free Seed Use on Lands Administered by the Bureau of Land Management (BLM 2006d)
- Energy Policy Act of 2005 (USCS 2005)
- EPCA Reauthorization of 2000 (EPCA 2000)
- Executive Orders
  - Executive Order 13007 (Indian Sacred Sites)
  - Executive Order 13112 (Invasive Species)
  - Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments)
  - Executive Order 13186 (Migratory Birds)
- Handbook H-1601-1, Land Use Planning Handbook (BLM 2005b)
- Healthy Forests Restoration Act of 2003 (USC 2003)
- Manual H-8410-1, BLM Visual Resource Inventory, Section V. Visual Resource Classes and Objectives (BLM 2003h)
- National Fire Plan (USFS 2000)
- Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the BLM in the State of Wyoming (BLM 1998b)
- Wyoming Weed and Pest Control Act Designated List of Designated Noxious Weeds and Declared List of Weeds and Pests (Wyoming Weed and Pest Council 2005a and 2005b)
- Wyoming Weed Management Strategic Plan (Wyoming State Weed Team 2003).

Emerging Issues and Changing Circumstances

The BLM uses a nine-step planning process when developing and revising RMPs.

Emerging issues and changes in local, regional, and national circumstances to consider when revising the existing plan include the following:

- Increasing and conflicting demands on the planning area's resources and resource uses
- Increasing complexity of resource management issues
- Increasing energy prices and interest in energy exploration and development
- Changes in the legal status of plants and wildlife potentially occurring in the planning area
- Growing Wildland-Urban Interface (WUI) areas and fire management
- Changes in the National Historic Trail (NHT) setting related to adjacent development
- Urbanization of rural areas and the WUI
- Addressing habitat fragmentation given BLM's requirement for multiple use management and sustained yield
- Trespass on private lands and public access to public lands
- Spread of invasive nonnative plant species (INPS) on public lands
- Increasing use of OHV use on public lands.

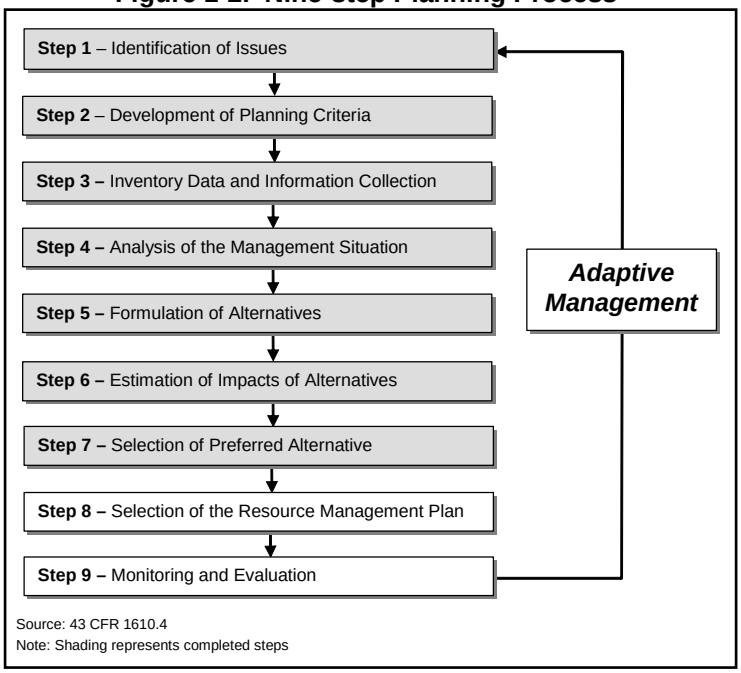
1.3 Planning Process

Revision of an existing plan is a major federal action for the BLM. The National Environmental Policy Act (NEPA) of 1969, as amended, requires federal agencies to prepare an EIS for major federal actions; thus, this EIS accompanies the revision of the existing plan. This EIS analyzes the impacts of five alternative RMPs for the planning area, including the No Action Alternative. The No Action Alternative reflects current management (the existing plan). NEPA requires analysis of a No Action Alternative.

1.3.1 Nine-Step Planning Process

The BLM uses a nine-step planning process (see Figure 1-2) when developing and revising RMPs as required by 43 CFR 1600 and planning program guidance in the BLM Handbook H-1601-1, *Land Use Planning Handbook* (BLM 2005b). The planning process is designed to help the BLM identify the uses of BLM-administered lands desired by the public and to consider these uses to the extent they are consistent with the laws established by Congress and the policies of the executive branch of the federal government.

Figure 1-2. Nine-step Planning Process



As depicted in Figure 1-2, the planning process is issue-driven (Step 1). The BLM utilized the public scoping process to identify planning issues to direct (drive) the revision of the existing plan (see Appendix C). The scoping

process also was used to introduce the public to preliminary planning criteria, which set limits to the scope of the RMP revision (Step 2).

As appropriate, the BLM collected data to address planning issues and to fill data gaps identified during public scoping (Step 3). Using these data, the planning issues, and the planning criteria, the BLM conducted an MSA (Step 4) to describe current management and to identify management opportunities for addressing the planning issues. Current management reflects both management under the existing plan and management that would continue through selection of the No Action Alternative.

Results of the first four steps of the planning process clarified the purpose and need and identified key planning issues that need to be addressed by the RMP revision. Key planning issues reflect the focus of the RMP revision and are described in more detail in the Planning Issues section.

The alternatives represent a reasonable range for managing resources and resource uses within the planning area.

During alternative formulation (Step 5), the BLM collaborated with cooperating agencies to identify goals and objectives (desired outcomes) for resources and resource uses in the planning area. These desired outcomes addressed the key planning issues, were constrained by the planning criteria, and incorporated the management opportunities identified by the BLM.

The details of alternatives were filled in through the development of management actions and allowable uses anticipated to achieve the goals and objectives. The alternatives represent a reasonable range for managing resources and resource uses within the planning area. Chapter 2 of this document describes and summarizes the alternatives.

This EIS also includes an analysis of the impacts of each alternative in Chapter 4 (Step 6). With input from cooperating agencies and BLM specialists, and consideration of planning issues, planning criteria, and the impacts of alternatives, the BLM selected a Preferred Alternative from among alternatives A through D (Step 7). Alternative E (Preferred Alternative) is the fifth alternative and is analyzed in Chapter 4 of this EIS.

Step 8 of the land use planning process will occur following receipt and consideration of public comments on the Draft EIS. Step 9 occurs through implementation of the selected RMP.

1.3.2 Resource Management Plan Implementation

Planning and decisionmaking for the management of BLM-administered lands is a tiered, ongoing process. Documents produced during each successive tier are progressively more focused in scope and more detailed in terms of their identification of specific measures to be undertaken and impacts that may occur. The four tiers are described briefly below:

- The RMP provides an overall vision of the future (goals and objectives) and includes measurable steps, anticipated management actions, and allowable uses to achieve that vision.
- Upon approval of the RMP, subsequent implementation decisions are carried out by developing activity-level or project-specific plans.

The RMP provides an overall vision of the future (goals and objectives) and includes measurable steps, anticipated management actions, and allowable uses to achieve that vision.

- If an activity-level plan is developed, it usually describes multiple projects for a single resource program (e.g., habitat management plan) or multiple projects for multiple resource programs.
- If a project-specific plan is developed, it usually describes a single project or several related projects.

In general, a planning-level EIS is prepared at the RMP tier and a more detailed EIS or Environmental Assessment (EA) is prepared at the implementation tier. The activity- or project-level plans reflect the management direction and vision articulated in the revised RMP. In most cases, these subsequent plans include additional public review and environmental compliance. Only the first of these tiers, the RMP, is involved in the present document. As a result, activity- and project-level plans are not considered further in this document.

The RMP provides basic program direction with the establishment of goals, objectives, and allowable uses. The RMP focuses on what resource conditions, uses, and visitor experiences should be achieved and maintained over time. Since this involves consideration of natural processes with long-term timeframes, the RMP must take a long-term view.

1.4 Decision Framework

As described in the previous section, defining the planning issues and planning criteria represent the first steps in narrowing the scope of the RMP revision. The planning issues and planning criteria provide the framework in which RMP decisions are made. RMP decisions refer to what is established or determined by the final RMP. For example, the BLM received several nominations (issues) for ACEC during the scoping process for the RMP revision. These issues fall within one of the planning criteria (see Planning Criteria section), the need to identify and analyze areas potentially suitable for ACEC designation. The RMP revision will establish (decide) whether any ACEC will be designated within the planning area. In this example, the land use planning decision is referred to as *allowable use*. The RMP provides guidance for land use planning decisions in accordance with the following categories:

- Physical, biological, and heritage resources
- Resource uses and support
- Special designations.

In the context of these categories, the planning team develops management strategies aimed at providing viable options for addressing planning issues. The management strategies provide the building blocks from which general management scenarios and, eventually, the more detailed resource management alternatives, are developed. The resource management alternatives reflect a reasonable range of management options that fall within limits set by the planning criteria. The planning issues and planning criteria used to revise the existing plan are described in the following sections.

1.4.1 Planning Issues

The BLM conducted an early and open scoping process to determine the scope of issues to be addressed in this EIS. As part of the scoping process, the BLM solicited comments and issues from the public, organizations, tribal governments, and federal, state, and local agencies, as well as from BLM specialists. The BLM's Land Use Planning Handbook defines planning issues as "…disputes or controversies about existing and potential land and resource allocations, levels of resource use, production, and related management practices." (BLM 2005). Issues identified during the scoping and RMP revision process for this EIS comprise two categories:

- Issues within the scope of the EIS and used to develop alternatives or otherwise addressed in the EIS

- Issues outside the scope of the EIS or that could require policy, regulatory, or administrative actions

Those planning issues determined to be within the scope of the EIS are used to develop one or more of the alternatives or are addressed in other parts of the EIS. For example, as planning issues were refined, the BLM collaborated with cooperating agencies to develop a reasonable range of alternatives designed to address and (or) resolve key planning issues such as what areas are suitable for energy and mineral resource development. A reasonable range of alternatives provides various scenarios for how BLM and cooperating agencies can address this and other key planning issues including the management of resources and resource uses in the planning area. In other words, key planning issues serve as the rational for alternative development. The key planning issues identified for developing alternatives in this EIS are listed below:

Energy and Mineral Resources

- What areas are suitable or not suitable for energy and mineral resource development?
- What level of development should be allowed in areas suitable for energy and mineral resource development?

Specifically, issues help determine the decisions to be made in the RMP and focus the scope of environmental analyses.

Vegetation and Habitat Management

- How should soil, water, and vegetation be managed to reduce fuel loads, achieve forest health and healthy rangelands while providing for livestock grazing and fish and wildlife habitat?
- How should special status species conservation strategies be applied given BLM's requirement for multiple use management and sustained yield? How will these strategies affect other public land resources?

Land Ownership Adjustments, Access and Transportation

- What land adjustments are necessary to improve access and management of public lands?
- How should travel be managed to provide access for recreation, commercial uses, and general enjoyment of the public lands while protecting cultural and natural resources?

Special Designations

- What areas, if any, contain unique or sensitive resources requiring special management?

In addition to key planning issues, other issues, themes, and positions were identified during the scoping process. Those issues determined to be outside the scope of the EIS or that could require policy, regulatory, or administrative actions to address were not used to develop alternatives and were not carried forward in this EIS. For example, issues that should be addressed by other agencies or by industry were considered out of scope for this EIS. Similarly, issues related to the conflicting rights of split estate could require policy, regulatory, or administrative actions and were not addressed in detail in this EIS.

Items that were considered but not carried forward for detailed study in the EIS because they were outside the scope of the RMP revision, could not be acted upon or did not require action, or because they required the BLM to exceed its authority, are summarized below:

- BLM should consult, work, and coordinate with or otherwise recognize specific organizations, agencies, and (or) authorities.

- BLM should analyze impacts from specific actions or activities that will occur or be addressed during subsequent RMP implementation decisions.
- BLM should conduct site-specific analyses, inventories, or surveys, or adopt specific measures or mandates.
- BLM should adopt or otherwise ensure the RMP revision is compatible with specific regulations, policies, mandates, guidance, or plans, or integrate one or more of these items into the planning process.
- BLM should adopt or require site-specific stipulations, resource protection measures, or technologies.

For a detailed description of all issues identified during scoping, please refer to the Casper Field Office Final Scoping Report (BLM 2004b). The scoping report is available on the Casper RMP web site http://www.blm.gov/rmp/casper/.

1.4.2 Planning Criteria

Planning criteria are the standards, rules, and guidelines that help to guide the RMP planning process.

Planning criteria are the standards, rules, and guidelines that help to guide the RMP planning process. These criteria influence all aspects of the planning process, including inventory and data collection, development of issues to be addressed, formulation of alternatives, estimation of impacts, and selection of the Preferred Alternative. In conjunction with the planning issues, planning criteria ensure that the planning process is focused and incorporates appropriate analyses. Planning criteria are developed from appropriate laws, regulations, and policies. The criteria also help to guide the final plan selection and are used as a basis for evaluating the responsiveness of the planning options.

Planning criteria used in this RMP revision are as follows:

- The revised RMP will recognize valid existing rights.
- Planning decisions will cover BLM-administered public lands, including split-estate lands where the subsurface minerals are severed from the surface right, and the BLM has legal jurisdiction over one or the other.
- The RMP planning effort will be collaborative and multi-jurisdictional in nature. The BLM will strive to ensure that its management decisions are complementary to its planning jurisdictions and adjoining properties within the boundaries described by law and regulation.
- The environmental analysis will consider a reasonable range of alternatives that focus on the relative values of resources and respond to the issues. Management prescriptions will reflect the principles of multiple use and sustained yield.
- The BLM will consider current scientific information, research, new technologies, and the results of resource assessments, monitoring, and coordination to determine appropriate local and regional management strategies that will enhance or restore impaired ecosystems.
- The Wyoming Standards for Healthy Rangelands will apply to all activities and uses (BLM 1998b).
- The BLM will address socioeconomic conditions and environmental justice.

- The BLM will provide for public safety and welfare relative to fire, hazardous materials, and abandoned mine lands (AMLs).
- Visual resource management class designations will be analyzed and modified to reflect present conditions and future needs.
- The BLM will consider current and potential future uses of the public lands through the development of reasonable foreseeable future development and activity scenarios based on historical, existing, and projected levels of use.
- Planning decisions will include the preservation, conservation, and enhancement of cultural, historical, paleontological, and natural components of public land resources, while considering energy development and other surface-disturbing activities.
- The BLM will coordinate with tribes to identify sites, areas, and objects important to their cultural and religious heritages.
- Planning decisions will comply with the ESA and BLM interagency agreements with the USFWS.
- Areas potentially suitable for ACEC or other special management designations will be identified and, where appropriate, brought forward for analysis in the EIS.
- Waterway segments are classified and determinations of eligibility and suitability will be made in accordance with Section 5(d) of the Wild and Scenic Rivers Act. Appropriate management prescriptions for maintaining or enhancing the outstanding remarkable values and classifications of waterway segments meeting suitability factors will be part of the RMP revision.
- OHV use management decisions in the revised RMP will be consistent with the BLM's National OHV Strategy (BLM 2001b).
- Decisions in the revised RMP will comply as appropriate with all applicable laws, regulations, policy, and guidance.
- Known areas in the planning area with coal development potential are located in northeastern Converse County. Coal screening determinations were made on these areas during planning efforts for the Buffalo RMP (BLM 2001a) and Thunder Basin National Grasslands Land and Resource Management Plan (USFS 2001). No additional coal-screening determinations or coal-planning decisions are anticipated for the Casper Field Office RMP, unless public submissions of coal resource information or surface resource issues indicate a need to update these determinations.

1.4.3 Relevant Statutes, Limitations, and Guidelines

Numerous federal and state laws and applicable regulations, policies, and actions could impact the alternatives analyzed in this EIS. The FLPMA is the primary authority for the BLM's management of public lands. This law provides the overarching policy by which public lands are managed and establishes provisions for land use planning, land acquisition, administration, range management, ROW, designated management areas, and the repeal of certain laws and statutes. The FLPMA also requires the BLM to provide food and habitat for fish, wildlife, and domestic species. In addition, the BLM is integrating the results of EPCA Reauthorization of 2000 and Public Law (P.L.) 106-469 (discussed in Chapter 2) into all RMPs.

NEPA provides for public input regarding issue identification and consideration of the environmental impacts of major federal actions that impact the quality of the human environment. Additional laws, regulations, and policies guiding management of public lands are identified in Appendix B.

1.4.4 Other Related Plans

BLM planning policies require that the BLM review approved or adopted resource plans of other federal, state, local, and tribal governments and, where practicable, be consistent with those plans. Table 1-3 identifies plans that are related to the management of land and resources that apply to this RMP revision.

Table 1-3. Plans Related to the Management of Land and Resources that Apply to the Casper Resource Management Plan Revision

Related Plans	Related Plans
Medicine Bow-Routt National Forest Revised Land and Resource Management Plan (USFS 2003b)	General Management Plan, Development Concept Plan, Interpretive Prospectus for the Fort Laramie National Historic Site (BLM 1993)
Thunder Basin National Grasslands Land and Resource Management Plan (USFS 2001)	Buffalo Field Office Resource Management Plan (BLM 2001a)
Converse County Land Use Plan (Converse County Planning Commission 2003)	Lander Field Office Resource Management Plan (BLM 1987)
Natrona County Land Use Plan (Natrona County Planning Commission 1998)	Newcastle Field Office Resource Management Plan (BLM 2000b)
The Casper Mountain Land Use Plan (Worthington et al. 2004)	Rawlins Field Office Resource Management Plan (BLM 2004f)
Goshen County Land Use Plan (Oblinger-Smith Corporation 1977)	U.S. Fish and Wildlife Service Pathfinder Interim Management Plan (USFWS 2004a)
Washakie Resource Management Plan (BLM 1988a)	

BLM Bureau of Land Management
USFS U.S. Forest Service
USFWS U.S. Fish and Wildlife Service

In addition, Section 368 of the Energy Policy Act of 2005 (designation of West-wide energy corridors) is being implemented through the current development of an interagency Programmatic Environmental Impact Statement (PEIS). The Final PEIS will provide plan amendment decisions that will address numerous energy corridor related issues, including the utilization of existing corridors (enhancements and upgrades), identification of new corridors, supply and demand considerations, and compatibility with other corridor and project planning efforts. It is likely that the identification of corridors in the PEIS will affect the Casper Planning Area, and the approved PEIS would subsequently amend the Casper RMP.

1.5 Consultation and Coordination

This section describes specific actions taken by BLM to consult and coordinate with tribes, government agencies, and interest groups; and to involve the interested general public during preparation of the EIS. A Notice of Intent (NOI) published in the *Federal Register* on June 20, 2003, formally announced the intent of BLM to revise the existing plan and prepare the associated EIS. Publication of the NOI initiated the scoping process and invited participation of affected and interested agencies, organizations, and the general public in determining the scope and issues to be addressed by alternatives and analyses in the EIS. Additional detail regarding actions taken by BLM to involve the public and consult and coordinate with tribes, government agencies, and interest groups is provided in Appendix C.

1.5.1 Consultation and Coordination

This section documents the consultation and coordination efforts undertaken by the BLM throughout the process of revising the RMP and developing the Draft EIS. Title II, Section 202, of the Federal Land

Policy and Management Act (FLPMA) directs the BLM to coordinate planning efforts with Native American tribes, other federal departments, and agencies of the state and local governments as part of its land use planning process. The BLM is also directed to integrate NEPA requirements with other environmental review and consultation requirements to reduce paperwork and delays (40 Code of Federal Regulations [CFR] 1500.4-5). The BLM accomplished coordination with other agencies and consistency with other plans through on-going communications, meetings, and collaborative efforts with the ID Team, which includes BLM specialists and federal, state, and local agencies.

Cooperating Agencies

The Casper Field Office extended cooperating agency status to the State of Wyoming, Converse County, Natrona County, Platte County, Goshen County, various conservation districts, and tribal governments. The BLM invited these agencies to participate because they have jurisdiction by law or because they offer special expertise. A list of the cooperating agencies that have actively participated in cooperators' meetings leading up to the development of the RMP revision and Draft EIS include the following:

Local Governments

- Converse County Commissioners
- Natrona County Commissioners
- Platte County Commissioners
- Converse County Conservation District
- Lingle-Fort Laramie Conservation District
- North Platte Valley Conservation District
- South Goshen Conservation District
- Natrona County Conservation District

Federal Government

- U.S. Environmental Protection Agency
- USDI National Park Service, Fort Laramie National Historic Landmark

State of Wyoming

- Wyoming State Planning Office
- Wyoming Department of Agriculture
- Wyoming Department of Environmental Quality
- Wyoming Department of State Parks and Cultural Resources – State Historic Preservation Office
- Wyoming Department of State Parks and Cultural Resources – State Trail Program
- Wyoming State Oil and Gas Commission
- Wyoming Game and Fish Department
- Wyoming Office of State Lands and Investments

BLM formally invited the cooperating agencies to participate in the development of RMP alternatives and to provide existing data and other information relative to their agency responsibilities, goals, mandates, and expertise. Cooperating agencies provided input during the initial scoping process on issues of special expertise or legal jurisdiction. In addition, cooperating agencies participated in a series of alternative formulation workshops, reviewed draft information and documents, and met with BLM management and

resource specialists periodically throughout the revision process to discuss planning issues and provide input to the process. Table 1-4 lists these meetings and workshops.

Table 1-4. Meetings with Cooperating Agencies

Date	Location	Type of Meeting
September 25, 2003	Casper, Wyoming	Introduction to the BLM Planning Process (For Cooperating Agencies)
January 2004	Douglas, Wyoming	Consistency Review with USFWS
February 9-13, 2004	Casper, Wyoming	***Workshop #1:*** Alternative Formulation (All Cooperating Agencies)
March 1-5, 2004	Casper, Wyoming	***Workshop #2:*** Alternative Formulation (All Cooperating Agencies)
October 25-28, 2004	Casper, Wyoming	***Workshop #3:*** Cooperators' Review of the Preferred Alternative (All Cooperating Agencies)
April 7, 2005	Douglas, Wyoming	Field Manager's Meeting with Cooperating Agencies
May 2005	Casper, Wyoming	Alternatives Reformulation – Biological Resources WGFD
August 3-4, 2005	Casper, Wyoming	***Workshop #4:*** Field Manager's Meeting with Cooperators on Reformulated Alternatives
May 18, 2006	Douglas, Wyoming	Field Manager's Meeting with Cooperating Agencies

BLM Bureau of Land Management
USFWS U.S. Fish and Wildlife Service
WGFD Wyoming Game and Fish Department

Section 7 Consultation

The Casper Field Office contacted the U.S. Fish and Wildlife Service (USFWS) regarding Section 7 of the Endangered Species Act (ESA). The BLM sent a letter to the USFWS concerning Section 7 consultation presenting the approach for consultation and the process of Programmatic Species-Specific Section 7 Consultations on Wyoming BLM RMPs. The USFWS provided the following species lists to the Casper Field Office for evaluating BLM Section 7 responsibilities:

- List of Threatened and Endangered species in the Bureau of Land Management, Casper Field Office, dated March 18, 2004
- Endangered, Threatened, Proposed and Candidate Species, and Designated Critical Habitat in Wyoming State, dated March 23, 2004.

Consultation letters between the USFWS and the Casper Field Office are located in Appendix C. The Casper Field Office will continue consultation with the USFWS through completion of the final biological assessment and final RMP.

Native American Interests

Consultation with Native American tribes is part of the NEPA scoping process and a requirement of FLPMA. The Casper Field Office took multiple steps to contact the tribes and include them in the scoping process. On October 23, 2003, the BLM sent letters to the following tribes inviting them to be a part of the planning process through consultation and public scoping meetings, as well as requesting information to be considered in the planning process:

- Blackfeet Nation
- Cheyenne River Sioux Tribe

- Comanche Tribes of Oklahoma
- Confederated Salish and Kootenai Tribe
- Crow Tribe
- Eastern Shoshone Tribe
- Kiowa Tribe of Oklahoma
- Lower Brule Sioux Tribe
- Nez Perce Tribe
- Northern Arapaho Tribe
- Northern Cheyenne Tribe
- Oglala Lakota Nation
- Rosebud Sioux Tribe
- Shoshone-Bannock Tribe
- Ute Tribe

Following the scoping process, the BLM sent a letter to each of the above-listed tribes on August 6, 2004, requesting specific information in identifying areas of special concern for the tribes and presented the opportunity for meetings or field trips with representatives from the tribes. Representatives from the Casper Field Office followed up on these letters with telephone calls to each tribe. In letters and during the follow-up calls the BLM stressed the desire for the tribes to review and comment on the Draft EIS.

On January 31, 2005, the BLM sent letters to the tribes concerning the Cedar Ridge Traditional Cultural Property (TCP) located in the planning area. The letters informed the tribes on how the Preferred Alternative would impact the TCP and asked for any information or concerns that the tribes had concerning the TCP.

Members of the Northern Arapaho, Northern Cheyenne, and Crow tribes met with representatives from the Casper Field Office between February and March 2005, to discuss details of the RMP. After the meetings, the tribes received maps of the general locations of cultural and spiritual interest to the tribes, as well as an offer to meet again and take part in a tour of the planning area. On November 18, 2005, BLM sent letters to the above-listed tribes inviting them to become cooperating agencies in the preparation of the Caser RMP.

The Confederated Salish and Kootenai Tribe was the only tribe that declined participation in consultation during the planning process. The other tribes expressed intent to participate in future steps during consultation. Native American consultation letters are in Appendix C.

1.5.2 Public Involvement

The BLM decisionmaking process is conducted in accordance with the requirements of the NEPA, CEQ regulations implementing NEPA, and the USDI and BLM policies and procedures implementing NEPA. NEPA and the associated regulatory and policy framework require federal agencies involve the interested general public in their decisionmaking.

In accordance with CEQ scoping guidance, the BLM provided avenues for public involvement as an integral part of revising the RMP and preparing the EIS. CEQ scoping guidance defines scoping as the "process by which lead agencies solicit input from the public and interested agencies on the nature and extent of issues and impacts to be addressed and the methods by which they will be evaluated" (CEQ 1981). The scoping report, which summarizes issues identified during the scoping process, is available on the Casper RMP web site at http://www.blm.gov/rmp/casper.

The intent of the scoping process is to provide opportunity for the general public tribes, other government agencies, and interest groups the to scope the planning process and to identify planning issues to be addressed by alternatives or analysis in the EIS. In general, public involvement assists the agencies by the following:

- Broadening the information base for decisionmaking
- Informing the public about the Draft EIS and proposed RMP and the potential impacts associated with various management decisions
- Ensuring that public needs and viewpoints are brought to the attention of the agency.

Scoping Period

Publication of the NOI on June 20, 2003, initiated the scoping period and announced the BLM's intention to revise the Casper RMP and prepare a Draft EIS. Scoping for the RMP revision and Draft EIS took place from June 20, 2003, to November 20, 2003. BLM regulations require a 30-day scoping period; however, the Casper revision scoping period remained open for 5 months.

The BLM utilized the public scoping process to identify planning issues to direct (drive) the formulation of alternatives and to frame the scope of analysis in the EIS. The scoping process also was used to introduce the public to preliminary planning criteria, which set limits to the scope of the RMP revision. Approximately 45 comment letters were received during the scoping period. The scoping report provides a general summary of the issues found in these letters.

Scoping Notice

The BLM prepared a public scoping notice and mailed the notice to 1,104 federal, state, and local agencies, interest groups, and members of the general public on October 20, 2003. In the scoping notice, the BLM solicited written comments on the RMP revision process, issues, and impacts and invited the public to a series of four public scoping meetings held throughout the planning area. The scoping notice served to remind the public of the opportunity to view the Summary of the Management Situation Analysis (MSA), the project schedule, and other relevant project information on the Casper RMP revision web site. In addition, the scoping notice provided general information on the planning area, background information on the planning process, and dates and locations scheduled for the public scoping meetings.

Scoping Meetings

Public scoping meetings were held in Wheatland, Torrington, Douglas, and Casper, Wyoming, on November 10, 11, 12, and 13, 2003, respectively. BLM structured the meetings in an open-house format, with two formal presentations made by the Casper Field Office Manager during each meeting. Resource specialists and other representatives of the BLM were on hand to personally address questions and provide information to meeting participants. The BLM provided four fact sheets, an executive summary of the MSA, and a series of four display boards at each scoping meeting. The BLM encouraged attendees to comment using a variety of media, including written comment forms, flip charts, planning area maps, and a computer kiosk. Table 1-5 identifies the public scoping meetings.

Table 1-5. Public Involvement, Coordination, and Consultation Meetings (2003)

Date	Location	Type of Meeting
November 10, 2003	Wheatland, Wyoming	Public Scoping Meeting
November 11, 2003	Torrington, Wyoming	Public Scoping Meeting
November 12, 2003	Douglas, Wyoming	Public Scoping Meeting
November 13, 2003	Casper, Wyoming	Public Scoping Meeting

Opportunities to Comment

The BLM provided a variety of avenues through which the public could submit comments during the scoping period. These avenues are listed below:

- **Mail** – The NOI and the scoping notice invited interested parties to submit comments by mail to the Casper Field Office.
- **E-mail** – The NOI provided the following e-mail address for submitting comments electronically: crmpwymail@blm.gov.
- **Online –** The Casper RMP revision web site at www.blm.gov/rmp/casper/ was launched on November 3, 2003. The web site provides history about the project, a project schedule, a document library, a mailing-list screen, and a comment screen. The public can enter their comments on the website and submit them electronically throughout the RMP revision process.
- **Telephone –** The scoping notice and all four fact sheets provided a phone number so interested parties could call and submit verbal comments.
- **In Person at the Scoping Meetings** – The BLM provided the public the opportunity to comment at all four public meetings. Comment methods included a computer kiosk, through which interested individuals could type in their comments; forms that could be filled out and submitted at the meetings or mailed in at a later date; and flip charts for expressing comments and concerns to share with BLM and other members of the public.

Mailing List

The mailing list for public scoping was initially developed from the Casper Field Office mailing list, but was updated throughout the planning process. The BLM encouraged scoping meeting participants to add their names to the mailing list. Some individuals added themselves to the project mailing list by registering on the project web site, as well as through personally contacting the BLM and requesting placement on the mailing list. Currently, the Casper Field Office mailing list includes 1,492 addresses.

Newsletters

Periodic newsletters are published to keep the public informed of the Casper RMP revision and Draft EIS planning process. The January 2004 newsletter provided background information on the project, including the purpose and need for updating the RMP and issues that the plan may address. The newsletter also extended an invitation to the public to be involved in the process, advertised the Casper RMP revision web site, and summarized public scoping comments.

The February 2005 newsletter described the development of the alternatives, the process of selecting a preferred alternative, announced the schedule of the Draft EIS, and offered avenues for public involvement. The third newsletter, distributed three weeks before release of the Draft EIS, announced the publication of the Draft EIS and provided details on how to provide comments.

Website

The Casper RMP revision and Draft EIS web site is located at http://www.blm.gov/rmp/casper. The site serves as a virtual repository for documents related to the development of the RMP revision and Draft EIS, including announcements, bulletins, and draft and final documents. These documents are available in PDF format to ensure they are available to the widest range of interested parties. The web site gives the public the opportunity to submit comments and be added to the project mailing list.

Future Public Involvement

Public participation is ongoing throughout the planning process. Members of the public have the opportunity to comment on the content of the Draft EIS during the specified 90-day comment period. The Final EIS will consider all substantive oral and written comments received during the 90-day comment period. The Record of Decision (ROD) will be issued by the BLM after the release of the Final EIS, the Governor's Consistency Review, and a potential Protest Resolution.

Distribution List

A copy of the Draft EIS has been provided to the following governments, individuals, and institutions:

Tribal Governments

- Blackfeet Nation
- Cheyenne River Sioux Tribe
- Comanche Tribe of Oklahoma
- Confederated Salish and Kootenai Tribe
- Crow Tribe
- Eastern Shoshone Tribe
- Kiowa Tribe of Oklahoma
- Lower Brule Sioux Tribe
- Nez Perce Tribe
- Northern Arapaho Tribe
- Northern Cheyenne Tribe
- Oglala Lakota Nation
- Rosebud Sioux Tribe
- Shoshone-Bannock Tribes
- Ute Tribe

Local Governments (Counties, Cities, Towns)

Converse County, Wyoming

- Converse County Commissioners
- Converse County Conservation District
- Converse County Farm Bureau
- Douglas Chamber of Commerce

Natrona County, Wyoming

- Casper Area Convention and Visitors Bureau
- Casper Chamber of Commerce
- City of Casper
- Natrona County Commissioners
- Natrona County Conservation District

Platte County, Wyoming

- Platte County Commissioners
- Platte County Conservation District
- Wheatland Chamber of Commerce

Goshen County, Wyoming

- Goshen County Commissioners
- Lingle-Fort Laramie Conservation District
- North Platte Valley Conservation District
- South Goshen Conservation District
- Torrington Chamber of Commerce

State of Wyoming

- Senator Jim Anderson, Converse/Platte
- Senator John Barrasso, Natrona
- Senator Bill Hawks, Natrona
- Senator Kit Jennings, Natrona
- Senator Charles K. Scott, Natrona
- Senator Curt Meier, Goshen/Platte
- Representative James C. Hageman, Goshen/Platte
- Representative Ross Diercks, Converse/Goshen
- Representative Edward Buchanan, Goshen
- Senator Charles Townsend, East Converse/North East Goshen
- Representative Deborah Alden, Converse/Platte
- Representative Bob Brechtel, Natrona
- Representative Roy Cohee, Natrona
- Representative Dave Edwards, Converse
- Representative Gerald Gay, Natrona
- Representative Mary Meyer Gilmore, Natrona
- Representative Steve Harshman, Natrona
- Representative Thomas A. Lockhart, Natrona
- Representative Ann Robinson, Natrona
- Representative Tom Walsh, Natrona

Wyoming State Agencies

- Office of the Governor, Environmental Policy Division
- Wyoming Business Council
- Wyoming Department of Environmental Quality
  - Air Quality Division
  - Land Quality Division
- Wyoming Department of Agriculture
- Wyoming Department of State Parks and Cultural Resources
  - State Museum
- Wyoming Department of Transportation
- Wyoming State Planning Office
- Wyoming Game and Fish Department
  - Casper Office
- Wyoming State Geologic Survey
- Wyoming Office of State Lands and Investments
- Wyoming State Engineer's Office
- Wyoming State Historic Preservation Office
- Wyoming Department of Administration and Information
- Wyoming Federal Highway Administration
- Wyoming Department of Employment, Research, and Planning Division

Wyoming State Boards/Commissions

- Air Quality Advisory Board
- Board of Wildlife Commissioners
- Natural Gas Pipeline Authority
- Natural Gas Pipeline Authority
- Wyoming Agriculture Board
- Wyoming Environmental Quality Council
- Wyoming Farm Bureau Federation
- Wyoming Land Quality Advisory Board
- Wyoming Livestock Board
- Wyoming Mining Council
- Wyoming Oil and Gas Conservation Commission
- Wyoming Recreation Commission
- Wyoming State Board of Outfitters and Professional Guides
- Wyoming State Grazing Board
- Wyoming Trails Council

Associations/Councils

- Coalbed Methane Coordination Coalition
- Mormon Trails Association
- Oregon-California Trails Association
- Petroleum Association of Wyoming
- Powder River Basin Resource Council
- Powder River Basin Resource Council
- Wildlife Habitat Council
- Wyoming Association of Municipalities
- Wyoming County Commissioners Association
- Wyoming Mining Association
- Wyoming Natural Diversity Database
- Wyoming Outdoor Council
- Wyoming Sportsman's Association
- Wyoming Stockgrowers Association
- Wyoming Wilderness Association
- Wyoming Woolgrowers Association
- Independent Petroleum Association of Mountain States

Clubs/Alliances/Societies/Groups

- American Wildlands
- Audubon Society
- Audubon Wyoming
- Back Country Horsemen of America
- Biodiversity Conservation Alliance
- Casper Dirt Riders
- Conservancy of the Phoenix
- Foundation for North American Wild Sheep
- Izaak Walton League
- Land and Water Fund of the Rockies
- Murie Audubon Society
- National Wildlife Federation
- North American Pronghorn Foundation
- Outdoor Women of Wyoming
- Pathfinder Back Country Horsemen
- Platte River Parkway Trust
- Platte River Rod and Gun Club
- Public Lands Advocacy Rocky Mountain Elk Foundation
- Sierra Club
- The Conservation Fund
- The Land and Water Fund of the Rockies
- The Land Trust Alliance
- The Nature Conservancy
- The Wilderness Society
- The Wildlife Society
- Trout Unlimited
- Western Land Exchange Project
- Wyoming Fly Casters Association
- Wyoming Motorcycle Trails Association
- Wyoming Nature Conservancy
- Wyoming Wildlife Federation

Congressional Delegation

- U.S. Senator Mike Enzi
  - Washington, D.C., Casper, Cheyenne, Gillette
- U.S. Senator Craig Thomas
  - Washington, D.C., Cheyenne, Sheridan, Casper
- U.S. Representative Barbara Cubin
  - Washington, D.C., Cheyenne, Casper

U.S. Department of the Interior Agencies

- Bureau of Indian Affairs
- U.S. Bureau of Reclamation
  Washington, D.C., and Casper and Provo, Wyoming, offices
- Minerals Management Service
- National Park Service
  Washington, D.C., and Denver, Colorado, offices
- Office of Environmental Policy and Compliance
- Natural Resources Library
- Office of Surface Mining
- U.S. Fish and Wildlife Service
  Washington, D.C.; Denver, Colorado; and Cheyenne, Wyoming, offices
- U.S. Geological Survey
  Washington, D.C., and Cheyenne, Wyoming, offices

Other Federal Agencies

- U.S. Environmental Protection Agency
- U.S. Department of Agriculture
  - Forest Service
    - » Big Horn National Forest
    - » Black Hills National Forest
    - » Bridger-Teton National Forest
    - » Medicine Bow/Routt National Forest
    - » Shoshone National Forest
  - Natural Resource Conservation Service
    - » Casper and Baggs, Wyoming, offices
- Army Corp of Engineers
- Department of Energy
  Western Area Power Area
    - » Loveland and Lakewood, Colorado, offices
- Federal Highway Administration
- Federal Energy Regulatory Commission
- U.S. Government Printing Office
- National Weather Service

Other Governmental Agencies

- Colorado Division of Water Resources
- State of Colorado, Department of Public Health and Environment, Air Pollution Control Division
- Colorado State Forest Service
- Routt County Planning Director
- Platte River Power Authority

Bureau of Land Management

- Buffalo Field Office
- Cody Field Office
- Kemmerer Field Office
- Lander Field Office
- Newcastle Field Office
- Pinedale Field Office
- Rawlins Field Office
- Rock Springs Field Office
- Worland Field Office
- Wyoming State Office - Cheyenne
- Washington Office

Libraries

- Library of Congress
- University of Wyoming Library
- Converse County Public Library
- Goshen County Public Library
- Natrona County Public Library
- Casper College Library
- Eastern Wyoming College Library
- Platte County Public Library

Educational Institutions

- Eastern Wyoming University
- Casper College
- University of Wyoming
  - Trustees
  - Geology Museum
  - Department of Rangeland Ecology
  - Department of Geology and Geophysics
- Western Wyoming Community College
  - Archeological Services

Media

Cheyenne
- Cheyenne Newspaper
  Wyoming State Tribune Eagle
- Cheyenne Radio
  KRAE
  KJJL
  KFBC
  KGAB
- Cheyenne TV
  KGWN-TV5
  KLWY
  KKTU

Casper
- Casper Newspapers
  Casper Star Tribune
  Casper Journal
- Casper Radio
  KASS
  KQLT
  LVOC
  KMCD
  KYOD
- Casper TV
  KTWO
  KWYF
  KGWC
  KCWY
  KFNB

Douglas
- Douglas Newspaper
  Douglas Budget
- Douglas Radio
  KKTY

Glenrock
- Glenrock Newspaper
  Glenrock Independent

Guernsey
- Guernsey Newspaper
  Guernsey Gazette

Moorcroft
- Moorcroft Newspaper
  Moorcroft Leader

Paonia, CO
- Paonia, CO Newspaper
  High Country News

Torrington
- Torrington Newspaper
  Torrington Telegram
- Torrington Radio

KGOS

Wheatland
- Wheatland Newspaper
  Platte County Record Times
- Wheatland Radio
  KYCN
  KZEW

Statewide Newspapers
- *Wyoming Business Report*
- *Wyoming Livestock Roundup*

Statewide Radio
- Wyoming Public Radio
- Northern Broadcasting System
- KYCN

Wire Services
- Wyoming Associated Press

1.6 Topics Not Addressed in This Resource Management Plan Revision

Laws, regulations, policies, and executive orders require specific resource topics be examined during the NEPA process. In some instances, initial evaluation reveals topics that are not relevant to the planning area or do not require further analysis. Examples of these topics are listed below.

- Prime and Unique Farmlands—In accordance with the Farmland Protection Policy Act, the BLM determined that no prime or unique farmlands or farmland of statewide or local importance occur on public lands in the planning area. None of the actions proposed in this RMP revision would disturb farmlands; therefore, impacts on prime and unique farmlands were not analyzed further in this RMP revision.

- Wild Horses and Burros—Herd areas are limited to areas of the public lands identified as being habitat used by wild horses and burros at the time of passage of the 1971 Wild Free-Roaming Horse and Burro Act. A horse area had been identified in the planning area at Deer Creek in Natrona County, but it was determined that the area was used only by privately owned, feral horses (BLM 1977). Wild horses and burros, therefore, were eliminated from further discussion in this RMP revision.

CHAPTER 2
RESOURCE MANAGEMENT ALTERNATIVES

Roadmap to Chapter 2

This chapter describes how alternatives A through E were developed; their components; other alternatives that were considered, but later eliminated from further consideration; and a comparative summary of impacts for each alternative.

2.1 Alternative Formulation (Page 2-2)

2.2 Alternative Components (Page 2-2)

- Desired Outcomes (Goals and Objectives)
- Allowable Uses and Management Actions
- Reasonable Foreseeable Development and Reasonable Foreseeable Action Scenarios

2.3 Alternatives Considered, but Not Carried Forward for Detailed Analysis (Page 2-4)

2.4 Alternatives Considered in Detail (Page 2-7)

- Alternative A (No Action Alternative)
- Alternative B
- Alternative C
- Alternative D
- Alternative E (Preferred Alternative)

2.5 Details of Alternatives (Page 2-26)

2.6 Summary of Environmental Consequences by Alternative (Page 2-102)

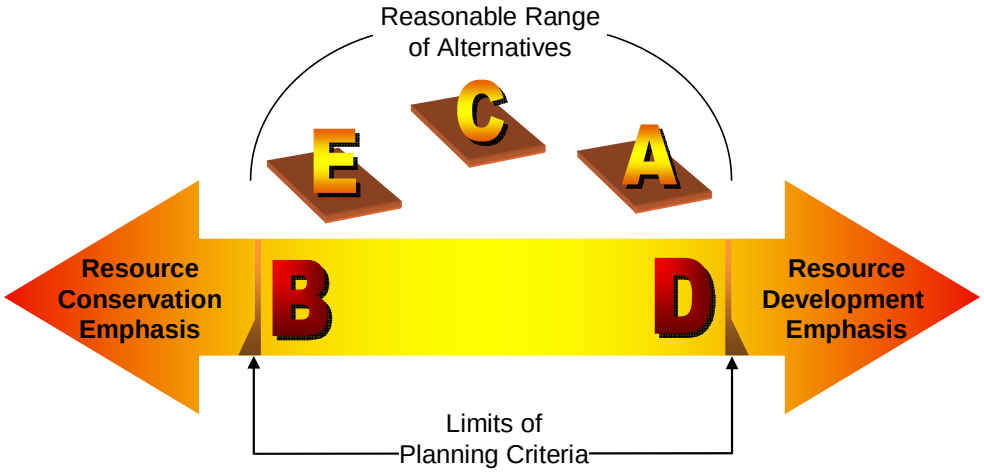
CHAPTER 2
RESOURCE MANAGEMENT ALTERNATIVES

This Environmental Impact Statement (EIS) evaluates five resource management alternatives identified by the letters A, B, C, D, and E. The No Action (Alternative A) represents the continuation of current management direction. The Bureau of Land Management (BLM) developed the Action alternatives B, C, and D with input from the public during scoping, cooperating agencies, and BLM resource specialists. Once developed, the BLM analyzed alternatives A through D to predict their impacts on the environment. The BLM used the impacts analysis of alternatives A through D, along with knowledge of specific issues raised throughout the planning process; recommendations from cooperating agencies and BLM resource specialists; consideration of planning criteria; and resolution of resource conflicts to select Alternative E, the Preferred Alternative. Each alternative provides a different emphasis for managing public lands and resources within the planning area, and each Action Alternative represents a complete and reasonable land use plan that meets the purpose and need described in Chapter 1.

This EIS evaluates the No Action and four Action Alternatives (five alternatives).

The BLM manages public lands and resource values in accordance with the principles of multiple use and sustained yield. Given these principles and the inherent conflicting nature of resource conservation and resource development, alternative formulation occurs within the limits of planning criteria that address the needs of present and future generations, while remaining flexible for periodic adjustments. This approach resulted in a reasonable range of alternatives that vary by their emphasis on allowable uses and management actions that affect conservation and development. For example, restrictions on oil and gas development in and around occupied greater sage-grouse leks may exclude or constrain one land use (i.e., oil and gas development) to protect another (i.e., special status species – wildlife). Of course, not all resources or resource uses are mutually exclusive, but rarely do actions beneficial to one resource benefit all of the other resources and resource uses that the BLM must manage. The multitude of resources within the planning area coupled with the requirement to manage for multiple use and sustained yield requires developing alternatives across a continuous spectrum from resource conservation to resource development. For example, overall, Alternative B places more emphasis on resource conservation, whereas Alternative D places more emphasis on resource development. The remaining alternatives (A, C, and E) fall in between B and D on the continuous spectrum, as shown in Figure 2-1.

Figure 2-1. Reasonable Range of Alternatives for the Casper Planning Area



The BLM formulated each Action Alternative to meet the purpose and need of this RMP revision. Although the No Action Alternative does not meet the purpose and need, its inclusion and consideration is required by Council on Environmental Quality (CEQ) regulations. The alternatives differ primarily with respect to their emphases on resource conservation or resource development and the degree to which they address the key planning issues and planning criteria identified in Chapter 1. Action Alternatives or their components (e.g., allowable uses and management actions) that did not fall within the planning criteria, did not meet the purpose and need, or that are already part of an existing plan, policy, requirement, or administrative function that will continue under the revised Resource Management Plan (RMP) were considered, but not carried forward for detailed analysis in this EIS.

2.1 Alternative Formulation

The BLM conducted a series of three workshops in the Casper Field Office with an Interdisciplinary (ID) Team comprising BLM staff and local, state, and federal cooperating agencies. During the initial workshop, the ID Team shared their respective knowledge and expertise and collaborated to identify goals and objectives (desired outcomes) representing a full range of alternatives for each resource. The second workshop narrowed the scope of alternatives to a reasonable range limited by the planning criteria.

The BLM formulated three alternatives (B, C, and D) from the information gathered during the first two workshops; the ID Team reviewed these Action Alternatives during the third workshop. During the third workshop, the ID Team also provided BLM management with recommendations for selecting the Preferred Alternative—Alternative E.

The Preferred Alternative indicates the agency's preliminary preference. The Preferred Alternative does not represent a final BLM decision and may change between publication of the Draft and Final EIS based on comments received on the Draft EIS, new information, or changes in BLM policies or priorities. BLM selected the Preferred Alternative based on the following selection criteria:

The Preferred Alternative does not represent a final BLM decision and may change between publication of the Draft and Final EIS.

1. Satisfy statutory requirements
2. Reflect the best combination of decisions to achieve BLM goals and policies
3. Represent the best solution to the purpose and need
4. Provide the best approach addressing key planning issues
5. Consider cooperating agencies and BLM specialists' recommendations.

2.2 Alternative Components

Alternatives described in this chapter represent approaches to addressing key planning issues (see Chapter 1) and to managing resources and resource uses in the planning area. Each alternative comprises two categories of land use planning decisions: (1) desired outcomes (goals and objectives) and (2) allowable uses and management actions. These two categories, as well as the Reasonable Foreseeable Development (RFD) scenario for oil and gas and Reasonable Foreseeable Actions, (RFAs) are discussed below.

2.2.1 Desired Outcomes (Goals and Objectives)

Goals and objectives provide overarching direction for BLM actions in meeting the agency's legal, regulatory, policy, and strategic requirements. Goals and objectives initially were identified during the first workshop and refined through subsequent collaboration with cooperating agencies. Goals are broad statements of desired outcome, but generally are not measurable. Objectives are more specific statements

of a desired outcome that may include a measurable component. Objectives generally are anticipated to achieve the stated goals.

2.2.2 Allowable Uses and Management Actions

Allowable uses and management actions comprise the second category of land use planning decisions and are anticipated to achieve the desired outcomes (goals and objectives). Alternatives were refined to address planning issues, resolve resource conflicts, improve consistency, and ensure resource-specific decisions for the following categories in the RMP revision process: (1) Physical, Biological, and Heritage Resources; (2) Resource Uses and Support; and (3) Special Designations.

Management actions are proactive measures or limitations intended to guide BLM activities in the planning area.

Management actions are proactive measures or limitations intended to guide BLM activities in the planning area. Two types of management actions are included in the alternatives. The first is *management actions common to all alternatives*, which will apply regardless of what alternative is selected. The second is *management actions by alternative*, which represent the choice(s) considered across alternatives.

Allowable uses identify where land uses are allowed, restricted, or prohibited on all BLM-administered surface lands and federal mineral estate in the planning area. Alternatives may include specific land use restrictions to meet goals and objectives and may exclude certain land uses to protect resource values. For example, alternatives considered for this RMP revision prohibit surface occupancy (i.e., no surface occupancy [NSO]) by oil and gas development within occupied greater sage-grouse leks and associated buffers. Because the alternatives identify whether particular land uses are allowed, restricted, or prohibited, allowable uses often include a spatial (e.g., map) component.

The second type of management action, *management actions by alternative*, represents the range of choices considered across alternatives. An example of this type of management action is to restore riparian habitat to address issues of water quality and (or) fish and wildlife habitat. In this example, the acreage or mileage of riparian habitat to restore varies by alternative, whereas the action (restore riparian habitat) is retained for all alternatives.

Although anticipated to achieve desired outcomes, the components described above may not be achieved during the planning period due to limitations in funding or staffing, changing policies or priorities, or new information. These factors could also affect the rate of RMP implementation. It is important to note that the RMP is strategic in nature, and, while it provides an overarching vision for managing resources in the planning area, it must also be flexible to changing priorities, information, and circumstances.

2.2.3 Reasonable Foreseeable Development and Reasonable Foreseeable Action Scenarios

The BLM projected the RFA scenario, for each resource program under each alternative (see Appendix M). Using trend data, the RFAs predict actions (and associated surface disturbance acreage) for each resource program. For example, RFAs for the livestock grazing program predict the number of infrastructure developments (e.g., springs, wells, pits, reservoirs, fences, and pipelines) and estimated surface disturbance acreage for each alternative over the life of the plan. For oil and gas, the prediction is referred to as an RFD scenario. The RFD predicts the number of wells and estimated acres of surface disturbance for the unconstrained (baseline) and each alternative scenario. The allowable uses, management actions, RFAs, and RFD form the basis for the impact analysis of alternatives described in Chapter 4.

The Energy Policy and Conservation Act (EPCA) Reauthorization of 2000, P.L. 106-469, directed the Secretary of the Interior to conduct an inventory of oil and natural gas resources beneath federal lands. The Act also directed the U.S. Department of the Interior (USDI) to identify the extent and nature of any

restrictions to resource development. As a result, the USDI, U.S. Department of Agriculture, and the U.S. Department of Energy released the report, *Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to their Development* (referred to as the "EPCA Inventory"), in January 2003. In addition to EPCA, the final RMP will help to address the provisions of the Energy Policy Act of 2005, including oil and gas development, by identifying areas within the planning area suitable for energy development.

The BLM is integrating the results of the EPCA Inventory into this RMP revision; therefore the EPCA findings are common to all alternatives in this EIS.

The BLM is integrating the results of the EPCA Inventory into this RMP revision; therefore the EPCA findings are common to all alternatives in this EIS. The oil and gas resource inventory data are integrated into the RFD scenario for oil and gas that predicts future oil and gas development within the planning area for the unconstrained scenario. Using land use constraints (e.g., NSO) associated with allowable uses and management actions, expertise, and industry knowledge, the RFD projects the approximate number of wells that might be developed under the constrained scenarios for each alternative (Appendix M). For example, allowable use restrictions that exclude oil and gas leasing differ by alternative relative to the size of area excluded. The difference in the area excluded corresponds to a difference in the number of wells projected for each alternative. Moreover, because development of each well requires surface disturbance, the acreage of surface disturbance likewise varies by alternative.

Oil and gas lease stipulations may be modified or eliminated using the exception, modification, or waiver criteria outlined in Appendix F or through more site-specific environmental analysis. The BLM's authorized officer could modify those stipulations determined to be either too restrictive or too lenient relative to desired outcomes.

2.3 Alternatives Considered, but Not Carried Forward for Detailed Analysis

The following alternatives were considered, but not carried forward for detailed analysis because (1) they would not fulfill requirements of the Federal Land Policy and Management Act (FLPMA) or other existing laws or regulations, (2) they did not meet the purpose and need, (3) they were already part of an existing plan, policy, or administrative function, or (4) they did not fall within the limits of the planning criteria. The FLPMA requires the BLM to manage public lands and resources in accordance with the principles of multiple use and sustained yield, including recognizing the Nation's needs for domestic sources of minerals, food, timber, and fiber. Moreover, the BLM is required by law to recognize existing valid rights on public lands and manage public lands in accordance with existing laws, including, but not limited to, the General Mining Law of 1872 and the Mining and Minerals Policy Act of 1970.

- *Suspend all existing federal minerals leasing and development operations and cancel existing oil and gas leases.* The BLM must by law recognize all valid existing rights.
- *Emphasize the protection of resources by removing most, if not all, human uses.* Management actions including closure or prohibition of various resource uses over portions of the planning area are included in the alternatives.
- *Designate the entire planning area as a Special Management Area (SMA) to meet Class I Visual Resource Management (VRM) objectives.* The BLM conducted a visual inventory in accordance with BLM Manual Handbook 8410-1, Visual Resource Inventory, and established four VRM designations

The BLM assesses and monitors resource conditions and trends, and considers the best information available to either maintain or improve the health of the land to fulfill this mandate.

in accordance with BLM Manual 8400, Visual Resource Management.

- *Remove all stipulations and restrictions from oil and gas leases.* The mission of the BLM is to sustain the health, diversity, and productivity of public lands for the use and enjoyment of present and future generations. This includes encouraging the use of sound resource management practices to restore and maintain land conditions. The BLM assesses and monitors resource conditions and trends, and considers the best information available to either maintain or improve the health of the land to fulfill this mandate.
- *Remove existing Areas of Critical Environmental Concern (ACEC) designations.* ACEC designations in the existing plan include the Jackson Canyon and the Salt Creek Hazardous ACECs. Additional areas were nominated for consideration as ACECs during the scoping process. The BLM evaluated the importance and relevance of existing and nominated ACEC designations. Based on this evaluation, consideration of planning issues, and input from the public and cooperating agencies, the BLM carried forward the Jackson Canyon ACEC for all alternatives. The Salt Creek Hazardous ACEC was carried forward for three of the five alternatives.
- *Open the entire planning area to unregulated public access, OHV use, and other resource uses*. The BLM is required to provide safe facilities and conditions for visitors, users, and employees using public lands. Moreover, the BLM is responsible for protecting the public lands from illegal dumping of hazardous materials, theft or damage of federal property, public misuse of material resources, and negligent activities that cause resource damage. This alternative was not carried forward for detailed analysis because it does not fulfill the requirements of the FLPMA and other existing laws, does not meet purpose and need, and does not fall within the limits of the planning criteria.
- *Mandate directional drilling.* When the need arises to vacate the drilling of a vertical well, a directional (i.e., directional, horizontal, diagonal, lateral) well may be an option for resource protection. Circumstances resulting in directional drilling include adverse geologic and topographical features, a high density of cultural and historic material requiring in-depth testing and excavation, National Historic Trails (NHTs) or other Historic Trails viewshed considerations, and avoiding critical habitats, of threatened, endangered, or other special status species.

  Since there is an opportunity for some wells in the planning area to be directionally drilled, the BLM considered an alternative mandating the directional drilling of oil and gas wells in the planning area. This alternative was eliminated from further consideration and detailed analysis for the following reasons. Current technologies along with large reserves make it possible in some parts of the world to drill to a bottom hole location several miles from the surface location. However, as described below, the application of this technology is technically and economically limited.

  Within the planning area, oil and gas often is encountered in deep formations with limited porosity. Fracture stimulation is the key to developing an economic well in this type of reservoir. Directional wells can exhibit more severe problems than vertical wells due to collapse of the formation into the wellbore during fracture stimulation. In addition, directional drilling technology requires precise control of target locations in three dimensions. Even the thickest producing zones in the planning area are below the vertical resolution of current seismic technology and yield no target control for lateral drilling.

  Well economics are primarily dependent on the cost of drilling, which is influenced by the depth of the well, subsurface geologic conditions, and the amount of oil and gas ultimately produced by the well. The volume of oil and gas ultimately produced by the well must generate enough

revenue to repay the cost of drilling and completing the well and provide a rate of return sufficiently adequate to compel drilling of the well.

Although directional drilling costs have declined and the technical feasibility has improved over the past decade, exclusive use of directional drilling is not always economically feasible, and could result in wells not being drilled and reserves not being recovered. This does not meet either the Nation's energy needs or result in the maximum ultimate recovery of the oil and gas resources with minimum waste as required by 43 Code of Federal Regulations (CFR) 3161.2.

- *Prohibit surface water disposal of coalbed natural gas (CBNG) wastewater.* The BLM considered this alternative to respond to issues about potential impacts to aquifers, soils, and the quantity and quality of surface water in and downstream of disposal of CBNG produced water. Under this alternative, all produced water would be captured and re-injected into an underground stratum. The feasibility of an all re-injection alternative is limited. The BLM could not require industry to implement this alternative since discharge of produced water is under the jurisdiction of the Wyoming Department of Environmental Quality (DEQ), Wyoming State Engineer's Office and (or) the Wyoming Oil and Gas Conservation Commission (WOGCC). In addition, much of the planning area involves non-federal minerals and non-public surface over which the BLM has no jurisdiction. An all re-injection alternative also would limit the use of CBNG-produced water for beneficial purposes. BLM Instruction Memorandum (IM) No. WY-2005-14 addresses water disposal and land application disposal in the Powder River Basin (BLM 2005d).

- *Survey for, identify, and protect lands of wilderness quality.* The Wyoming wilderness review, directed by Section 603 of the FLPMA, began in the fall of 1978. The review was divided into three phases: inventory, study, and reporting. Through field inventory, review of available information, and consultation with industry, state government, conservation groups, individual citizens, and private organizations, 40 wilderness study areas (WSAs) were identified for study. The inventory was completed in May 1981. Since none of the 40 identified WSAs in Wyoming were located in the planning area, the wilderness review concluded with the inventory process.

During scoping for the RMP revision, one proposal to survey for and identify wilderness study areas was received. This proposal included, but was not limited to, the South Fork of the Powder River roadless area northeast of Notches Dome as identified in *Wild Wyoming* (Molvar 2001). As a result of this proposal, the BLM reviewed its current policy and guidance on wilderness inventory, identification, management, and protection of lands with wilderness characteristics. Based on the following factors, the WSA alternative was eliminated from further consideration and detailed analysis.

The settlement of a lawsuit in April 2003 over the designation of new WSAs on BLM-administered public lands in Utah (State of Utah vs. the U.S. Department of the Interior 2003) resulted in a significant change in BLM national policy regarding the U.S. WSAs (BLM 2003b). The changes are as follows:

1. The authority set forth in Section 603(a) of the FLPMA to complete the three-part wilderness review process expired on October 21, 1993. Section 202 of the FLPMA does not apply to new WSA proposals, and consideration of new WSA proposals on BLM-administered public lands is no longer valid.

2. Following expiration of the Section 603(a) process, no general legal authority exists for the BLM to designate lands as WSAs for management pursuant to the nonimpairment standard prescribed by Congress for Section 603 WSAs. The FLPMA land use plans completed after April 14, 2003, will not designate any new WSAs, nor manage any additional lands under the Section 603 nonimpairment standard.

3. The FLPMA land use plan decisions may accord special management protection for special values, such as naturalness, solitude, primitive recreation, or other values through the land use planning process.
4. The Consideration of Wilderness Characteristics in Land Use Planning, Wilderness Characteristics are defined as features of the land associated with the concept of wilderness (naturalness and opportunities for solitude and primitive and [or] unconfined recreation) that may be considered in land use planning when the BLM determines that they are reasonably present, of sufficient value (condition, uniqueness, relevance, importance) and need (trend, risk), and are practical to manage. While the Citizens' Proposal areas may be reasonably natural and contain opportunities for solitude and primitive and (or) unconfined recreation, they are not of sufficient value to warrant management for wilderness character. BLM no longer has the authority to establish new WSAs, and they do not meet ACEC criteria. Management priorities for these areas call for multiple use, including mineral development, in preference to preservation of existing landscapes. Alternatives considered in the RMP must be legal, and creating new WSAs is not.

To reduce the length and avoid confusion, only select meaningful differences (those with the most potential to affect resources) among alternatives are summarized in this section.

Alternatives or components identified as existing requirements under current laws, regulations, or standard operating procedures and policies, were not carried forward for detailed analysis: For example:

- **Cultural Resource Inventories.** Cultural resource inventories are conducted in compliance with Section 106 of the National Historic Preservation Act (NHPA). Inventories would be required by federal regulation or leasing stipulations in accordance with Section 106 of the NHPA and would continue to be incorporated.
- **Wildlife and Special Status Species Surveys and Conservation Measures.** Surveys and conservation measures currently required for wildlife and special status species in accordance with leasing stipulations, biological opinions, or regulations would continue under all alternatives. New survey or conservation measure requirements would be determined during subsequent site-specific actions, and, as appropriate, consultation.

2.4 Alternatives Considered In Detail

This section summarizes the five alternatives (A through E) considered in the EIS in detail. A description of the alternatives considered requires (1) a narrative to describe *what* decisions each alternative will establish and (2) maps to show *where* each decision will occur. With 67 maps and multiple special designations, resource uses, and management actions for more than 30 individual resources and resource uses, an exhaustive narrative description of each alternative would result in a lengthy and potentially confusing chapter. To reduce the length and avoid confusion, only select meaningful differences (those with the most potential to affect resources) among alternatives are summarized in this section.

Combined with the appendices and maps from Volume 2, Table 2-1 and Table 2-2 highlight the meaningful differences among alternatives relative to what they establish and where they occur. Following these tables, a narrative description of each alternative is provided under the following headings:

- Overview of the Alternative
- Physical, Biological, and Heritage Resources
- Resource Uses and Support
- Special Designations.

Table 2-1. Comparative Summary of Proposed Land Use Decisions for Physical, Biological, and Heritage Resources and Resource Uses and Support by Alternative in the Casper Planning Area
(all numbers in this table represent acreage unless otherwise noted)

Topic	Acreage Type	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E *(Preferred Alternative)*
Physical, Biological, and Heritage Resources						
Restrictions on Areas of Highly Erosive Soils	BLM-Administered Surface	CBC	256,240 (NSO)	256,240 (CSU)	No Restrictions	256,240 (CSU)
Use of Pitless Drilling Technology	BLM-Administered Mineral Estate	CBC	Required	Required if impact to surface or groundwater or soils	CBC	Required if impact to surface or groundwater or soils
Acres Closed to Disposal of Mineral Materials	BLM-Administered Mineral Estate	15,286	849,023	591,045	6,054	273,073
Acres Open to Oil and Gas and Other Leasables with Standard Stipulations	BLM-Administered Mineral Estate	1,136,855	446,019	1,012,656	1,524,375	1,080,935
Acres Open to Oil and Gas and other Leasables with Moderate Constraints	BLM-Administered Mineral Estate	2,711,404	1,196,922	2,058,162	2,445,107	2,506,530
Acres Open to Oil and Gas and other Leasables with Major Constraints	BLM-Administered Mineral Estate	770,991	2,296,267	1,113,078	662,664	843,139
Acres Closed to Oil and Gas and Other Leasables	BLM-Administered Mineral Estate	37,922	717,964	473,276	25,026	226,568
Acres Acceptable for Further Consideration for Coal Leasing	BLM-Administered Mineral Estate	59,694	0	0	59,694	59,694
Acres Unacceptable for Further Consideration for Coal Leasing	BLM-Administered Mineral Estate	2,266	4,657,172	4,657,172	2,266	2,266
Acres Unevaluated for Coal Leasing	BLM-Administered Mineral Estate	4,595,212	0	0	4,595,212	4,595,212
Habitat Fragmentation Areas	Planning Area	0	660,498	279,305	0	192,545
	BLM-Administered Surface	0	413,552	177,035	0	131,879
	BLM-Administered Mineral Estate	0	580,007	238,724	0	168,386
Breeding Planning Area Greater Sage-Grouse Lek Protective Buffers	Planning Area	24,062	116,659	21,654	24,062	63,380
	BLM-Administered Surface	7,572	40,897	14,959	7,572	26,068
	BLM-Administered Mineral Estate	17,474	89,210	31,561	17,474	51,841

Table 2-1. Comparative Summary of Proposed Land Use Decisions for Physical, Biological, and Heritage Resources and Resource Uses and Support by Alternative in the Casper Planning Area (Continued)
(all numbers in this table represent acreage unless otherwise noted)

Topic	Acreage Type	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E *(Preferred Alternative)*
Physical, Biological, and Heritage Resources						
Breeding and Nesting Planning Area Greater Sage-Grouse Protective Buffers in Nesting Habitat	Planning Area	1,071,755	2,703,861	1,197,312	1,071,755	1,289,712
	BLM-Administered Surface	345,533	788,774	400,445	345,533	435,981
	BLM-Administered Mineral Estate	794,600	1,940,880	891,383	794,600	960,342
Breeding Bates Hole and Fish Creek Willow Creek Greater Sage-Grouse Lek Protective Buffers	Planning Area	5,693	45,011	21,654	5,693	45,011
	BLM-Administered Surface	2,327	20,823	9,714	2,327	20,823
	BLM-Administered Mineral Estate	4,703	39,070	18,790	4,703	39,070
Breeding and Nesting Bates Hole and Fish Creek Willow Creek Greater Sage-Grouse Protective Buffers Habitat	Planning Area	207,357	433,537	335,895	207,357	433,537
	BLM-Administered Surface	97,522	190,856	153,599	97,522	190,856
	BLM-Administered Mineral Estate	167,365	339,906	266,826	167,365	339,906
Acreage Managed for DPC[1] for Aspen	BLM-Administered Surface	0	2,822	1,411	706	2,822
Acreage Managed for DPC[1] for Sagebrush	BLM-Administered Surface	0	630,183	315,902	157,546	630,183
Acreage Managed for DPC[1] for Mountain Shrub	BLM-Administered Surface	0	46,779	23,390	11,695	46,779
Miles of Lotic Habitat Managed for DPC[2]	BLM-Administered Surface	0	350	175	88	350
Acreage of Lentic Habitat Managed for DPC [2]	BLM-Administered Surface	0	10,000	5,000	2,500	10,000
Acres of Existing (Alternative A) and Proposed Surface Water for Fish and Wildlife	BLM-Administered Surface	1,500	2,500	2,000	1,600	1,600
Stream Miles of Improved Floodplain Connectivity	BLM-Administered Surface	N/A	350	108	75	75

Table 2-1. Comparative Summary of Proposed Land Use Decisions for Physical, Biological, and Heritage Resources and Resource Uses and Support by Alternative in the Casper Planning Area (Continued)
(all numbers in this table represent acreage unless otherwise noted)

Topic	Acreage Type	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E *(Preferred Alternative)*
Acres of Salt Cedar Eradication	BLM-Administered Surface	N/A	1,700	1,275	850	Inventory and Develop a Plan
Acres Managed for Potential Black-footed Ferret Reintroduction	BLM-Administered Surface	N/A	145,641	145,641	CBC	CBC
Restrictions on Surface Development On or Near Cultural Sites	BLM-Administered Surface	NSO on four sites (120 acres)	NSO on three sites and within 300-feet buffer	NSO on three sites and CSU within 300-feet buffer	NSO on four sites	NSO on three sites and CSU within 300-feet buffer
Visual Resource Management - Class II	BLM-Administered Surface	109,827	408,576	367,151	205,542	367,151
	BLM-Administered Mineral Estate	365,967	1,062,550	816,310	465,688	816,310
Visual Resource Management - Class III	BLM-Administered Surface	210,258	415,458	433,799	548,780	433,799
	BLM-Administered Mineral Estate	909,283	1,022,622	1,211,145	1,518,434	1,211,145
Visual Resource Management - Class IV	BLM-Administered Surface	953,543	537,543	560,627	607,255	560,627
	BLM-Administered Mineral Estate	3,200,074	2,572,000	2,629,717	2,673,050	2,629,717
Visual Resource Management - Class V	BLM-Administered Surface	2,074	N/A	N/A	N/A	N/A
	BLM-Administered Mineral Estate	6,881	N/A	N/A	N/A	N/A
Resource Uses and Support						
BLM Withdrawals	BLM-Administered Mineral Estate	488,531	2,253,132	1,314,556	52,243	578,699
Other Federal Withdrawals	BLM-Administered Mineral Estate	41,589	48,954	48,954	35,266	48,954
Wind-Energy Acres of Power Class 3, 4, and 5 within the Planning Area	BLM-Administered Surface	999,468	999,468	999,468	999,468	999,468
Wind-Energy Development Power Classes 3, 4, and 5 Exclusion Areas	BLM-Administered Surface	N/A[3]	817,977	517,831	178,013	331,630
Wind-Energy Development Power Classes 3, 4, and 5 Avoidance Areas	BLM-Administered Surface	N/A[3]	118,056	221,071	351,293	392,907

Table 2-1. Comparative Summary of Proposed Land Use Decisions for Physical, Biological, and Heritage Resources and Resource Uses and Support by Alternative in the Casper Planning Area (Continued)
(all numbers in this table represent acreage unless otherwise noted)

Topic	Acreage Type	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E *(Preferred Alternative)*
Wind-Energy Acres of Power Class 6 and 7 within the Planning Area	BLM-Administered Surface	146,129	146,129	146,129	146,129	146,129
Wind-Energy Development Power Classes 6 and 7 Exclusion Areas	BLM-Administered Surface	N/A[3]	89,356	43,919	3,593	31,948
Wind-Energy Development Power Classes 6 and 7 Avoidance Areas	BLM-Administered Surface	N/A[3]	29,768	55,216	71,468	65,099
Wind-Energy Development Power Classes 3 – 7 Acres Open Without Use Limitations	BLM-Administered Surface	429,294	27,005	307,560	541,230	324,013
Acres Closed to Livestock Grazing	BLM-Administered Surface	6,016	6,016	6,016	6,016	6,016
Number of SRMAs	BLM-Administered Surface	4	3	5	8	6
Acres Closed to OHV Use	BLM-Administered Surface	2,661	26,027	7,943	2,661	2,224
Acres Open to OHV Use	BLM-Administered Surface	187	242	285	285	285
Acres Limited to Existing Roads and Trails for OHV Use	BLM-Administered Surface	1,311,715	909,651	1,162,113	1,292,630	1,162,244
Acres Limited to Designated Roads and Trails for OHV Use	BLM-Administered Surface	47,014	425,657	191,236	66,001	196,824
Standard Disposal	BLM-Administered Surface	103,725	109,210	241,364	224,834	224,834
Restricted Disposal	BLM-Administered Surface	9,784	16,344	6,149	5,453	5,453
Retention	BLM-Administered Surface	1,248,068	1,236,083	1,114,064	1,131,290	1,131,290
ROW Exclusion Areas	BLM-Administered Surface	208,664	1,099,606	676,193	238,013	442,040

Table 2-1. Comparative Summary of Proposed Land Use Decisions for Physical, Biological, and Heritage Resources and Resource Uses and Support by Alternative in the Casper Planning Area (Continued)
(all numbers in this table represent acreage unless otherwise noted)

Topic	Acreage Type	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E *(Preferred Alternative)*
ROW Avoidance Areas	BLM-Administered Surface	723,619	167,379	311,758	489,922	539,799
Designated ROW Corridors	BLM-Administered Surface	92,113	110,437	92,113	0	115,885

[1] Alternative A manages toward DFC rather than DPC. Management toward DPC is assumed to exceed the requirements of managing toward DFC.

[2] Alternative A manages toward PFC rather than DPC. Management toward DPC is assumed to exceed the requirements of managing toward PFC.

[3] Alternative A: renewable-energy avoidance areas for all power classes = 723,619 acres
Alternative A: renewable-energy exclusion areas for all power classes = 208,664 acres

Note: Restrictions on resource uses (e.g., closed to leasing) apply to the life of the RMP, but can be changed by amending the RMP. Closed to leasing means deferred from leasing for the life of the plan.

BLM Bureau of Land Management
CBC case-by-case
CSU controlled surface use
DFC desired future condition
DPC desired plant community
N/A Not applicable
NSO no surface occupancy
OHV off-highway vehicle
PFC proper functioning condition
RMP Resource Management Plan
ROW rights-of-way
SRMA Special Recreation Management Area

Table 2-2. Comparative Summary of Proposed Special Designations by Alternative for the Casper Planning Area

Name	Emphasis	Acreage Type	Alternative A		Alternative B		Alternative C		Alternative D		Alternative E (Preferred Alternative)	
			Existing Designation	Acreage	Proposed Designation	Acreage	Proposed Designation	Acreage	Proposed Designation	Acreage	Proposed Designation	Acreage
Jackson Canyon ACEC	Bald Eagles	Total Surface	ACEC	14,025	ACEC	14,025	ACEC	14,025	ACEC	14,025	ACEC	14,025
		BLM-Administered Surface		3,938		3,938		3,938		3,938		3,938
		BLM-Administered Mineral Estate		11,104		11,104		11,104		11,104		11,104
Salt Creek Hazardous ACEC	Hazards	Total Surface	ACEC	235,325	ACEC	235,325	ACEC	235,325	No SD	0	No SD	0
		BLM-Administered Surface		77,566		77,566		77,566		0		0
		BLM-Administered Mineral Estate		203,228		203,228		203,228		0		0
Alcova Fossil Area	Paleontological Values	Total Surface	No SD	0	ACEC	7,073	ACEC	5,963	SMA	5,963	ACEC	5,963
		BLM-Administered Surface		0		5,981		5,282		5,282		5,282
		BLM-Administered Mineral Estate		0		6,913		5,805		5,805		5,805
Bates Hole	Greater Sage-Grouse; Watershed Values	Total Surface	No SD	0	SMA	375,221	SMA	375,221	No SD	0	SMA	375,221
		BLM-Administered Surface		0		158,023		158,023		0		158,023
		BLM-Administered Mineral Estate		0		288,504		288,504		0		288,504
Black-Tailed Prairie Dog	Prairie Dogs	Total Surface	No SD	0	ACEC	22,937	ACEC	22,937	No SD	0	No SD	0
		BLM-Administered Surface		0		3,103		3,103		0		0
		BLM-Administered Mineral Estate		0		14,846		14,846		0		0

Table 2-2. Comparative Summary of Proposed Special Designations by Alternative for the Casper Planning Area (Continued)

Name	Emphasis	Acreage Type	Alternative A		Alternative B		Alternative C		Alternative D		Alternative E (Preferred Alternative)	
			Existing Designation	Acreage	Proposed Designation	Acreage	Proposed Designation	Acreage	Proposed Designation	Acreage	Proposed Designation	Acreage
Cedar Ridge Traditional Cultural Property	Cultural Values	Total Surface	No SD	0	ACEC	21,742	SMA	19,055	No SD	0	No SD	0
		BLM-Administered Surface		0		14,065		12,481		0		0
		BLM-Administered Mineral Estate		0		19,637		16,994		0		0
North Platte River	Recreation; Wildlife	Total Surface	No SD	0	ACEC	85,392	ACEC	33,258	No SD	0	No SD	0
		BLM-Administered Surface		0		3,488		2,387		0		0
		BLM-Administered Mineral Estate		0		15,286		7,840		0		0
Salt Creek	Oil and Gas	Total Surface	No SD	0	No SD	0	SMA	23,911	SMA	90,931	SMA	23,911
		BLM-Administered Surface		0		0		19,325		35,616		19,325
		BLM-Administered Mineral Estate		0		0		22,228		79,420		22,228
Sand Hills	Sensitive Soils	Total Surface	No SD	0	SMA	17,633	SMA	17,633	No SD	0	SMA	17,633
		BLM-Administered Surface		0		17,633		17,633		0		17,633
		BLM-Administered Mineral Estate		0		17,633		17,633		0		17,633
South Bighorns/ Red Wall	Recreation; Wildlife	Total Surface	No SD	0	ACEC	262,901	SMA	369,325	No SD	0	SMA	93,352
		BLM-Administered Surface		0		146,812		206,155		0		55,945
		BLM-Administered Mineral Estate		0		216,460		309,854		0		75,913

Table 2-2. Comparative Summary of Proposed Special Designations by Alternative for the Casper Planning Area (Continued)

Name	Emphasis	Acreage Type	Alternative A		Alternative B		Alternative C		Alternative D		Alternative E (Preferred Alternative)	
			Existing Designation	Acreage	Proposed Designation	Acreage	Proposed Designation	Acreage	Proposed Designation	Acreage	Proposed Designation	Acreage
Wind River Basin	Oil and Gas	Total Surface	No SD	0	No SD	0	SMA	281,037	SMA	539,911	SMA	54,575
		BLM-Administered Surface		0		0		100,401		213,238		18,277
		BLM-Administered Mineral Estate		0		0		233,496		446,615		44,302

ACEC Area of Critical Environmental Concern
BLM Bureau of Land Management
SD Special Designation
SMA Special Management Area

Other than *Overview of the Alternative*, the above headings reflect categories through which program-specific guidance for land use planning decisions must be applied (BLM 2005b). Table 2-1 summarizes meaningful differences (typically relative to acres) among alternatives for the first two categories: Physical, Biological, and Heritage Resources and Resource Uses and Support. Table 2-2 summarizes meaningful differences (typically relative to designation and acres) among alternatives for Special Designations. Viewed in conjunction with the narrative for each alternative, Tables 2-1 and 2-2 highlight *what* meaningful decisions each alternative will establish. A complete description of all decisions proposed for each alternative, as well as a description of goals and objectives, are included in Table 2-3.

As discussed, goals and objectives (desired outcomes) are a category of land use planning decisions; however, they are not described in the alternative narrative because they do not differ among alternatives. Instead, the Details of Alternatives section describes the goals and objectives for each of eight resource topics (e.g., physical, mineral, biological, etc.). Because allowable uses and management actions differ among alternatives, they are described in the Details of Alternatives section for each alternative under the eight resource topics (e.g., physical, mineral, biological, etc.). The Details of Alternatives section in this chapter and the Maps in Volume 2 provide details of each alternative.

Decisions made by this RMP revision are anticipated to be subsequently implemented. Restrictions on resource uses (e.g., closed to leasing) apply to the life of the RMP, unless changed through an RMP amendment and public involvement. The timing and degree of implementation will depend on available budget, staffing, and agency priorities. Actions taken or authorized by the BLM during RMP implementation would comply with standard practices, best management practices (BMPs), and guidelines for surface-disturbing activities (Appendices I and K). Therefore, these practices and guidelines are considered part of each alternative.

Due to the general strategic nature of alternatives for an RMP revision, the need for additional mitigation is not identified in this document. During the implementation stage, additional environmental analyses will be conducted, as appropriate, for site-specific actions and the BLM will determine on a case-by-case basis what, if any, mitigation is required.

2.4.1 Alternative A (No Action Alternative)

2.4.1.1 Overview of the Alternative

Resources on lands administered by the BLM within the planning area are currently managed under the existing plan (BLM 1985a), as amended (including currently authorized activity plans [e.g., allotment management plans, habitat management plans]). Management under Alternative A continues to balance the use and development of planning area resources.

Management under Alternative A continues to balance the use and development of planning area resources.

2.4.1.2 Physical, Biological, and Heritage Resources

Under Alternative A, previous coal-screening decisions for lands in the coal development potential area (CDPA) in Converse County continue. These decisions identified 2,266 acres unacceptable for further consideration for coal leasing, and 59,694 acres acceptable for further consideration for coal leasing within the CDPA. The remaining 4,595,212 acres are unevaluated for coal leasing. Relative to leasing for oil and gas and other solid leasable minerals under this alternative, the smallest area (770,991 acres) is open with major constraints; most of the planning area is open with moderate (2,711,404 acres) constraints or with standard (1,136,855 acres) stipulations; and approximately 37,922 acres are closed.

Current management does not allow occupancy or other surface disturbance on slopes greater than 25 percent without written authorization of the authorized officer; however, no specific restrictions exist prohibiting surface occupancy or disturbing activities on highly erosive soils. For example, Alternative A does not restrict prescribed fire on highly erosive soils. Current management also evaluates the use of pitless technology for the drilling of oil and gas wells on a case-by-case basis.

Under Alternative A, there is no specific management action to avoid habitat fragmentation; however, Alternative A does include management actions protecting select species or their habitat.

Under Alternative A, there is no specific management action to avoid habitat fragmentation; however, Alternative A does include management actions protecting select species or their habitat. For example, Alternative A requires avoiding surface disturbance or occupancy within ¼ mile of occupied greater sage-grouse leks, conserving 7,572 acres of habitat on BLM-administered surface and 17,474 acres of habitat on BLM-administered mineral estate. In addition, the No Action Alternative requires avoiding surface-disturbing and disruptive activities in suitable greater sage-grouse nesting and early brood-rearing habitat within 2 miles of an occupied lek, or in identified greater sage-grouse nesting and early brood-rearing habitat outside the 2-mile buffer. The 2-mile buffer restriction applies to 345,533 acres of BLM-administered surface and 794,600 acres of BLM-administered mineral estate.

Other land use decisions affecting biological resources under Alternative A include management of mountain shrub (46,779 acres), sagebrush (630,183 acres), lotic (350 miles), and lentic (10,000 acres) communities on a case-by-case basis for desired future condition (DFC). Under Alternative A, no specific management actions are identified for acres of development of water sources for fisheries and waterfowl or for improving floodplain connectivity within the planning area. Likewise, no specific management actions exist for managing acres for potential black-footed ferret reintroduction or eradication of invasive nonnative plant species (INPS). These resources generally are managed on a case-by-case basis under the existing plan.

Visual resource values are managed in accordance with five VRM classes under Alternative A (refer to the Glossary). No VRM Class I areas are in the planning area. VRM Class II includes 109,827 acres of BLM-administered surface and 365,967 acres of federal mineral estate, where a higher standard for mitigation of visual impacts is required for development activities; VRM Class III includes 210,258 acres of BLM-administered surface and 909,283 acres of federal mineral estate; VRM Class IV includes 953,543 acres of BLM-administered surface and 3,200,074 acres of federal mineral estate; and VRM Class V includes 2,074 acres of BLM-administered surface and 6,881 acres of federal mineral estate.

2.4.1.3 Resource Uses and Support

The 78,935 acres of forests on BLM-administered surface land are managed in 17 Forest Management Areas (FMAs). Forest management focuses primarily on lodgepole and ponderosa pine; however, 2,822 acres of aspen are managed on a case-by-case basis for DFC. No acres of aspen or other habitat types in the planning area are managed for DPC under Alternative A.

Livestock grazing is allowed on all but 6,016 acres of the planning area. Ten percent of the grazing allotments are evaluated annually to see if they achieve rangeland health standards with emphasis on high priority (Category I and M) allotments. Stock driveways (SDWs) are used to the fullest extent possible.

Under Alternative A, the BLM maintains four Special Recreation Management Areas (SRMAs): North Platte River (3,561 acres), Muddy Mountain Environmental Education Area (EEA) (1,419 acres), Goldeneye Wildlife and Recreation Area (894 acres), and the Middle Fork Area (12,909 acres). The remainder of the planning area is managed as an Extensive Recreation Management Area (ERMA).

Travel Management Areas are not delineated in the planning area. Relative to all alternatives, the smallest area (2,661 acres) of BLM-administered surface is closed to OHV use under Alternative A. Conversely, the largest area (1,311,715 acres) of BLM-administered surface is limited to existing roads and trails for OHV use. The existing Poison Spider OHV Park (187 acres open to OHV use) continues "as is" under Alternative A. The recreation management matrices are included in Appendix O.

Current lands and realty program actions within the planning area identify 103,725 acres for disposal, 9,784 acres for restricted disposal, and 1,248,068 acres for retention (refer to the Glossary). Rights-of-way (ROW) exclusion and avoidance areas encompass 932,283 acres of BLM-administered surface. Designated ROW corridors encompass 92,113 acres of BLM-administered surface in Alternative A.

Under Alternative A, the BLM responds to proposals for renewable wind-energy development within the planning area on a case-by-case basis, without any limits related to power classes. Although interests in wind energy have recently increased, no wind farms currently exist in the planning area on BLM-administered surface. The area of BLM-administered surface open to renewable wind-energy development subject to avoidance limitations is 723,619 acres. The area of BLM-administered surface open to renewable wind-energy development without use limitation is 429,294 acres.

2.4.1.4 Special Designations

Currently, special designations in the planning area include Jackson Canyon ACEC (14,025 acres) for bald eagles, Salt Creek Hazardous ACEC (235,325 acres) for hazards, and National Back Country Byways for the South Bighorns/Red Wall and Seminoe/Alcova areas and the Oregon, Mormon Pioneer, California, and Pony Express National Historic Trails. These designations continue and no additional special designations are established under Alternative A.

Alternative B emphasizes conservation of physical, biological, and heritage resources with constraints on resource uses.

2.4.2 Alternative B

2.4.2.1 Overview of the Alternative

Alternative B emphasizes conservation of physical, biological, and heritage resources with constraints on resource uses. Relative to all alternatives, Alternative B conserves the most land area for physical, biological, and heritage resources; designates the highest number of ACECs (7); and is the most restrictive to OHV use and leasing for coal, oil and gas, and other solid leasable minerals.

2.4.2.2 Physical, Biological, and Heritage Resources

Under Alternative B, 4,657,172 acres are identified as unacceptable for further consideration for coal leasing. Relative to leasing for oil and gas and other solid leasable minerals, the largest area (2,296,267 acres) of any alternative is open with major constraints and the smallest area (446,019 acres) is open with standard stipulations under Alternative B. The area open to leasing with moderate constraints comprises 1,196,922 acres. Approximately 717,964 acres, the most of any alternative, are closed to leasing.

Alternative B prohibits surface disturbance on slopes greater than 25 percent, as well as on highly erosive soils (256,240 acres of BLM-administered surface). Alternative B also prohibits the use of prescribed fire on highly erosive soils. In addition, this alternative requires the use of pitless technology for the drilling of oil and gas wells.

For the purpose of avoiding further habitat fragmentation, 16 blocks of land (see Map 24) containing intact native vegetation and more than 50 percent public surface ownership are closed to oil and gas leasing, geophysical operations on public surface, mineral material disposal, and wind-energy development. Within these 16 blocks, a withdrawal is recommended. The withdrawal segregates from

operation of the public land laws, including the mining laws. The blocks encompass an area of 660,498 acres of low and gas development potential, of which 413,552 acres are BLM-administered surface and 580,007 acres are BLM-administered mineral estate.

Alternative B also includes management actions to conserve areas of contiguous habitat for select species. For example, Alternative B establishes an SMA for the Bates Hole area and prohibits surface disturbance or occupancy (NSO) within 4 miles of occupied greater sage-grouse leks. Surface disturbance or occupancy (NSO) is also prohibited within 4 miles of occupied greater sage-grouse leks in areas outside of the Bates Hole/Fish Creek Willow Creek area. Within the Bates Hole/Fish Creek Willow Creek area, 190,856 acres of BLM-administered surface and 339,906 acres of federal mineral estate are conserved.

Alternative B also includes management actions to conserve areas of contiguous habitat for select species.

Throughout the planning area, Alternative B also prohibits surface disturbance or occupancy (NSO) in suitable greater sage-grouse nesting and early brood-rearing habitat within 4 miles of an occupied lek. Moreover, surface-disturbing and disruptive activities in identified greater sage-grouse nesting and early brood-rearing habitats outside the 4-mile buffer are restricted from March 15 to July 15 (timing limitation stipulation or TLS). The 4-mile buffer restriction conserves 788,774 and 1,940,880 acres of BLM-administered surface and federal mineral estate respectively – the most of any alternative. Alternative B manages the same communities and acreage as the existing plan (46,779 acres of mountain shrub; 630,183 acres of sagebrush; 350 miles of lotic; and 10,000 acres of lentic); however, with an emphasis on desired plant community (DPC) rather than DFC. Relative to all alternatives, Alternative B constructs the most water sources for fisheries and waterfowl (1,000 acres) and improves 350 miles of floodplain connectivity within the planning area. In addition, Alternative B manages 145,641 acres for potential black-footed ferret reintroduction and eradicates 1,700 acres of salt cedar.

Four VRM classes (refer to the Glossary) identified for Alternative B are based on a visual resource inventory completed in 2004. There are no VRM Class I areas under all alternatives. Under Alternative B, approximately 408,576 acres of BLM-administered surface and 1,062,550 acres of federal mineral estate are classified as Class II areas; 415,458 acres of BLM-administered surface and 1,022,622 acres of federal mineral estate are classified as Class III areas; and 537,543 acres of BLM-administered surface and 2,572,000 acres of federal mineral estate are classified as Class IV areas.

2.4.2.3 Resource Uses and Support

The 78,935 acres of forests on BLM-administered surface land are to be inventoried and classified as commercial forestland or noncommercial woodland. Under Alternative B, watershed stability, wildlife habitat, and recreation are the primary resource considerations of forest management. Approximately 2,822 acres of aspen are managed for desired plant community (DPC) under Alternative B.

Under Alternative B, livestock grazing is allowed on the large majority of the planning area. Those areas currently identified as not available for grazing (6,016 acres) are closed. In addition, all grazing allotments are monitored annually and forage utilization limited to 40 percent of the current year's production. SDWs are retained and managed for their current use under Alternative B.

Under Alternative B, the BLM maintains the Muddy Mountain EEA and Middle Fork Area SRMAs, adds the Poison Spider OHV Park as an SRMA, and drops the Goldeneye Wildlife and Recreation area as an SRMA. The remainder of the planning area is managed as an ERMA. The recreation management matrices are included in Appendix O.

Relative to all alternatives, the largest area (26,027 acres) of BLM-administered surface is closed to OHV use under Alternative B. Conversely, the smallest area (909,651 acres) of BLM-administered surface is

limited to existing roads and trails for OHV use. The existing Poison Spider OHV Park (open to OHV use) is enlarged to 242 acres under Alternative B.

Under Alternative B, lands and realty program actions within the planning area include 109,210 acres for disposal, 16,344 acres for restricted disposal, and 1,236,083 acres for retention (refer to the Glossary). ROW exclusion and avoidance areas encompass 1,266,985 acres of BLM-administered surface. Designated ROW corridors encompass 110,437 acres of BLM-administered surface in Alternative B.

Under Alternative B, renewable wind-energy development is allowed in areas identified as having outstanding/superb potential (also known as power classes 6 and 7). Wind-energy development is not allowed under Alternative B in habitat fragmentation areas. The area of BLM-administered surface open to renewable wind-energy development, but subject to avoidance limitations is 29,768 acres. The area of BLM-administered surface open to renewable wind-energy development without use limitation is 27,005 acres, the smallest of any alternative.

2.4.2.4 Special Designations

The existing Jackson Canyon and Salt Creek Hazardous ACECs are retained and five additional (Alcova Fossil Area, Black-tailed Prairie Dog, Cedar Ridge Traditional Cultural Property (TCP), North Platte River, and South Bighorns/Red Wall) ACECs are designated under Alternative B. In addition, two SMAs are established under Alternative B: (1) Bates Hole for greater sage-grouse and watershed values, and (2) Sand Hills for sensitive soils. Also retained are the South Bighorns/Red Wall and Seminoe/Alcova National Back Country Byways and the Oregon, Mormon Pioneer, California, and Pony Express National Historic Trail designations.

2.4.3 Alternative C

Alternative C provides physical, biological, and heritage resource conservation similar to current management, while allowing for more recreation experiences.

2.4.3.1 Overview of the Alternative

Alternative C provides physical, biological, and heritage resource conservation similar to current management, while allowing for more recreation experiences. Alternative C establishes the most SMAs (6), including establishment of the most acreage for the proposed South Bighorns/Red Wall SMA. Regarding the conservation of physical, biological, and heritage resources and restrictions on mineral leasing, Alternative C is generally between alternatives B and D.

2.4.3.2 Physical, Biological, and Heritage Resources

As with Alternative B, 4,657,172 acres are identified as unacceptable for further consideration for coal leasing under Alternative C. Areas open to leasing for oil and gas and other solid leasable minerals with major, moderate, and standard stipulations are 1,113,078 acres, 2,058,162 acres, and 1,012,656 acres, respectively, under Alternative C. Approximately 473,276 acres are closed to leasing for oil and gas and other solid leasable minerals under this alternative.

Alternative C prohibits surface disturbance on slopes greater than 25 percent on highly erosive soils and minimizes disturbance to highly erosive soils (256,240 acres of BLM-administered surface) by modifying proposed activities to avoid areas of highly erosive soils. Alternative C limits the season of use and intensity of prescribed fire on highly erosive soils. The use of pitless technology for oil and gas drilling operations is required when there is potential for adverse impacts to surface water, groundwater, or soils.

Under Alternative C, habitat fragmentation restrictions identified for Alternative B only apply to eight intact native vegetation blocks containing big game crucial winter range or greater sage-grouse leks or habitats. These restrictions encompass an area of 279,305 acres of low oil and gas development potential,

of which 177,035 acres are BLM-administered surface and 238,724 acres are BLM-administered mineral estate.

Alternative C also includes management actions to conserve areas of contiguous habitats for select species. For example, Alternative C establishes the Bates Hole area as an SMA for the greater sage-grouse with restrictions similar to those identified under Alternative B; however, the buffer areas protecting occupied greater sage-grouse leks are reduced from ¾ mile to ½ mile under Alternative C. The buffer areas protecting occupied greater sage-grouse leks in the remainder of the planning area are also reduced from ½ mile to ¼ mile. The NSO acreage protecting breeding habitats (leks) in Bates Hole/Fish Creek Willow Creek is 9,714 acres of BLM-administered surface and 39,070 acres of federal mineral estate.

Alternative C prohibits surface disturbance on slopes greater than 25 percent on highly erosive soils and minimizes disturbance to highly erosive soils (256,240 acres of BLM-administered surface) by modifying proposed activities to avoid areas of highly erosive soils.

Alternative C prohibits surface disturbing or occupancy (NSO) in suitable greater sage-grouse nesting and early brood-rearing habitats within 2 miles of an occupied lek in the Bates Hole SMA. Throughout the remainder of the planning area, surface-disturbing and disruptive activities in suitable greater sage-grouse nesting and early brood-rearing habitats within 2 miles of an occupied lek are restricted from March 15 to July 15 (TLS). Within the Bates Hole SMA, surface-disturbing and disruptive activities are restricted from March 15 to July 15 (TLS) for an additional 1 mile where greater sage-grouse nesting and early brood-rearing habitats are identified. The 2-mile buffer restrictions amount to 345,533 and 794,600 acres, respectively, for BLM-administered surface and BLM-administered mineral estate.

Alternative C manages the same communities as the existing plan, but fewer acres are identified for management: mountain shrub (23,390 acres), sagebrush (315,902 acres), lotic (175 miles), and lentic (5,000 acres) communities, (with an emphasis on DPC rather than DFC). Alternative C also constructs 500 acres of water sources for fisheries and waterfowl and improves 108 miles of floodplain connectivity within the planning area. In addition, Alternative C manages 145,641 acres for potential black-footed ferret reintroduction and eradicates 1,275 acres of salt cedar.

Compared to the existing plan, Alternative C proposes more acres for VRM Class II and Class III and less acres for VRM Class IV. The acreages are as follows: Class II – 367,151 acres of BLM-administered surface and 816,310 acres of BLM-administered mineral estate, Class III – 433,799 acres of BLM-administered surface and 1,211,145 acres of BLM-administered mineral estate, and Class IV – 560,627 acres of BLM-administered surface and 2,629,717 acres of BLM-administered mineral estate. Isolated 40-acre parcels contiguous to U.S. Forest Service (USFS) property are managed to meet USFS visual objectives for those areas.

2.4.3.3 Resource Uses and Support

The 78,935 acres of forests on BLM-administered surface land are to be inventoried and classified as commercial forestland or noncommercial woodland. Under Alternative C, forests are managed to achieve a sustainable flow of wood products. Approximately 1,411 acres of aspen are managed for DPC under Alternative C.

Livestock grazing is allowed on the large majority of the planning area. Those areas identified as not available for livestock grazing (6,016 acres) are closed under Alternative C. Livestock grazing is managed to maintain a protective cover of vegetation and litter with emphasis on the condition of high priority (Category I and M) allotments with significant acreages of highly erosive soils. SDWs no longer active are revoked and animal unit months (AUMs) incorporated into adjacent allotments.

Under Alternative C, the BLM maintains three of the SRMAs identified in Alternative A. Recreation management for the North Platte River is included in the proposed ACEC management under Special Designations. Two SRMAs for the Poison Spider OHV Park and National Historic Trails are added under this alternative. For BLM-administered surface land in the planning area, approximately 7,943 acres are closed to OHV use and 1,162,113 acres are limited to existing roads and trails for OHV use. The existing Poison Spider OHV Park (open to OHV use) is enlarged to 285 acres under Alternative C. The recreation management matrices are included in Appendix O.

Under Alternative C, lands and realty program actions within the planning area include 241,364 acres for standard disposal, 6,149 acres for restricted disposal, and 1,114,064 acres for retention (refer to the Glossary). ROW exclusion and avoidance areas encompass 987,951 acres of BLM-administered surface. Designated ROW corridors encompass 92,113 acres of BLM-administered surface in Alternative C.

Under Alternative C, renewable wind-energy development is allowed in areas identified as having outstanding/superb (power classes 6 and 7) or fair/good/excellent (power classes 3, 4, and 5) potential. Wind-energy development is restricted in habitat fragmentation areas under Alternative C. The area of BLM-administered surface open to renewable wind-energy development subject to avoidance limitations is 276,287 acres. The area of BLM-administered surface open to renewable wind-energy development without use limitation is 307,560 acres.

2.4.3.4 Special Designations

The existing Jackson Canyon and Salt Creek Hazardous ACECs are retained and three additional ACECs (Alcova Fossil Area, Black-tailed Prairie Dog, and North Platte River) are designated under Alternative C. Six SMAs (the most of any alternative) are established under Alternative C: (1) Bates Hole for greater sage-grouse and watershed values, (2) Cedar Ridge TCP for cultural values, (3) Salt Creek for oil and gas, (4) Sand Hills for sensitive soils, (5) South Bighorns/Red Wall for recreation and wildlife, and (6) Wind River Basin for oil and gas. The existing plan National Back Country Byways and National Historic Trails designations continue under Alternative C.

2.4.4 Alternative D

Alternative D emphasizes resource uses (e.g., energy and mineral development, recreation, and forest products).

2.4.4.1 Overview of the Alternative

Alternative D emphasizes resource uses (e.g., energy and mineral development, recreation, and forest products). Relative to all alternatives, Alternative D conserves the least land area for physical, biological, and heritage resources; designates the lowest number of ACECs (1); and is the least restrictive to OHV use and leasing for oil and gas and other solid leasable minerals.

2.4.4.2 Physical, Biological, and Heritage Resources

Under Alternative D, approximately 2,266 acres are identified as unacceptable for further consideration for coal leasing, and 59,694 acres are identified as acceptable for further consideration for coal leasing. The remaining 4,595,212 acres are unevaluated for coal leasing. Areas open to leasing for oil and gas and other leasable minerals with major, moderate, and standard stipulations are 662,664 acres, 2,445,107 acres, and 1,524,375 acres, respectively, under Alternative D. Approximately 25,026 acres are closed to leasing for oil and gas and other solid leasable minerals under Alternative D, the least of any alternative.

Alternative D does not restrict surface-disturbing activities on slopes greater than 25 percent and allows surface-disturbing activities on highly erosive soils (256,240 acres of BLM-administered surface). Alternative D also allows prescribed fire on highly erosive soils. As under Alternative C, the use of pitless technology for oil and gas drilling operations is required when there is potential for adverse

impacts to surface water, groundwater, or soils. Under Alternative D, habitat fragmentation restrictions identified for other alternatives do not apply.

Management actions to conserve areas of habitat for the greater sage-grouse are included in Alternative D. For example, although Alternative D does not establish Bates Hole as an SMA, the same restrictions on surface disturbance or occupancy within ¼ mile of occupied greater sage-grouse leks as described for Alternative A applies. These restrictions protect breeding habitats comprising 7,572 acres of BLM-administered surface and 17,474 acres of BLM-administered mineral estate in the planning area. In addition, similar to current management, Alternative D requires avoiding surface-disturbing and disruptive activities in suitable greater sage-grouse nesting and early brood-rearing habitats within 2 miles of an occupied lek, or in identified greater sage-grouse nesting and early brood-rearing habitats outside the 2-mile buffer. The 2-mile buffer restrictions amount to 345,533 and 794,600 acres, respectively, for BLM-administered surface and BLM-administered mineral estate.

Alternative D manages the same communities for DPC as other alternatives, but on the smallest acreage of mountain shrub (11,695 acres), sagebrush (157,546 acres), lotic (88 miles), and lentic (2,500 acres) communities. Alternative D also constructs 100 acres of water sources for fisheries and waterfowl and improves 75 miles of floodplain connectivity within the planning area. Alternative D eradicates 850 acres of salt cedar. Alternative D does not identify specific acres to manage for potential black-footed ferret reintroduction.

Under Alternative D, forest stands are managed to achieve maximum wood growth and flow of forest products.

Alternative D proposes fewer acres of Visual Resource Management Class II areas than alternatives B and C, but more than Alternative A. Similarly, a larger portion of total surface acreage is in Classes III and IV. The acreages are as follows: Class II – 205,542 acres of BLM-administered surface and 465,688 acres of BLM-administered mineral estate, Class III – 548,780 acres of BLM-administered surface and 1,518,434 acres of BLM-administered mineral estate, and Class IV – 607,255 acres of BLM-administered surface and 2,673,050 acres of BLM-administered mineral estate.

2.4.4.3 Resource Uses and Support

The 78,935 acres of forests on BLM-administered surface land are to be inventoried and classified as commercial forestland or noncommercial woodland. Under Alternative D, forest stands are managed to achieve maximum wood growth and flow of forest products. Approximately 706 acres of aspen are managed for DPC under Alternative D.

Current management of livestock grazing continues with emphasis on high priority (Category I and M) allotments and no additional restrictions. All SDW withdrawals are revoked and trail use discontinued under Alternative D.

Under Alternative D, the BLM maintains the four SRMAs from Alternative A and adds four additional SRMAs: Poison Spider OHV Park, South Bighorns/Red Wall and Seminoe/Alcova National Back Country Byways, and the National Historic Trails. For BLM-administered surface land in the planning area, approximately 2,661 acres are closed to OHV use and 1,292,630 are limited to existing roads and trails for OHV use. The existing Poison Spider OHV Park (open to OHV use) is enlarged to 285 acres under Alternative D and an additional OHV park could be identified. The recreation management matrices are included in Appendix O.

Under Alternative D, lands and realty program actions within the planning include 224,834 acres for disposal, 5,453 acres for restricted disposal, and 1,131,290 acres for retention (refer to the Glossary).

ROW exclusion and avoidance areas encompass 727,935 acres of BLM-administered surface. No designated ROW corridors are included in Alternative D.

Under Alternative D, renewable wind-energy development is allowed in areas with power class ratings of fair/good/excellent or higher (1,145,597 acres). Areas identified as having potential for renewable energy development are actively marketed under Alternative D. The area of BLM-administered surface open to renewable wind-energy development subject to avoidance limitations is 422,761 acres. The area of BLM-administered surface open to renewable wind-energy development without use limitation is 541,230 acres.

2.4.4.4 Special Designations

The existing Jackson Canyon ACEC is retained and no new areas are designated as ACECs under Alternative D. The existing Salt Creek Hazardous ACEC is not retained under Alternative D. Three SMAs are established under Alternative D: (1) Alcova Fossil Area for paleontological values, (2) Salt Creek for oil and gas, and (3) Wind River Basin for oil and gas. The existing plan National Back Country Byways and National Historic Trails designations continue under Alternative D.

2.4.5 Alternative E (Preferred Alternative)

2.4.5.1 Overview of the Alternative

Alternative E increases conservation of physical, biological, and heritage resources compared to current management, including restrictions against habitat fragmentation and designation of five new SMAs. Alternative E also emphasizes moderate constraints on leasing for oil and gas and other solid leasable minerals.

Alternative E increases conservation of physical, biological, and heritage resources compared to current management.

2.4.5.2 Physical, Biological, and Heritage Resources

As under Alternative D, approximately 2,266 acres are identified as unacceptable for further consideration for coal leasing, and 59,694 acres are identified as acceptable for further consideration for coal leasing under Alternative E. The remaining 4,595,212 acres are unevaluated for coal leasing. Areas open to leasing for oil and gas and other solid leasable minerals with major, moderate, and standard stipulations are 843,139 acres, 2,506,530 acres, and 1,080,935 acres, respectively, under Alternative E. Approximately 226,568 acres are closed to leasing for oil and gas and other solid leasable minerals under Alternative E.

Alternative E does not allow occupancy or other surface disturbance on slopes greater than 25 percent without written authorization of the authorized officer and minimizes disturbance to highly erosive soils (256,240 acres of BLM-administered surface) by modifying proposed activities to avoid areas of highly erosive soils. Alternative E limits the season of use and intensity of prescribed fire on highly erosive soils. Like alternatives C and D, the use of pitless technology for oil and gas drilling operations is required when there is potential for adverse impacts to surface water, groundwater, or soils.

Habitat fragmentation restrictions for Alternative E are the same as described for Alternative C, except the boundaries of five intact blocks are adjusted and all allowed surface-disturbing activities within the adjusted blocks are subject to a controlled surface use (CSU) stipulation, minimizing surface disturbance to meet management objectives.

The Bates Hole and Fish Creek Willow Creek area under Alternative E have a ¾-mile CSU buffer for occupied greater sage-grouse leks (20,823 acres of BLM-administered surface and 39,070 acres of BLM-administered mineral estate) to protect breeding habitats. Occupied greater sage-grouse leks also have a

4-mile buffer (190,856 acres of BLM-administered surface and 339,906 acres of BLM-administered mineral estate) where surface development or wildlife-disturbing activities are restricted from March 15 through July 15 (TLS). Surface disturbance is required to avoid (year-round) sagebrush stands (of greater than 10 percent canopy cover).

Alternative E manages the same communities for DPC as Alternative B, including mountain shrub (46,779 acres), sagebrush (630,183 acres), lotic (350 miles), and lentic (10,000 acres) communities. Alternative E also constructs 100 acres of water sources for fish and waterfowl and improves 75 miles of floodplain connectivity within the planning area. Alternative E does not identify specific acreage to manage for potential black-footed ferret reintroduction or to eradicate salt cedar; however, under Alternative E, salt cedar is to be inventoried and a plan developed for eradicating this INPS over the life of the plan. Alternative E proposes the same acreage as Alternative C for the VRM Classes II, III, and IV.

2.4.5.3 Resource Uses and Support

The 78,935 acres of forests on BLM-administered surface land are to be inventoried and classified as commercial forestland or noncommercial woodland. Under Alternative E, forests are managed to achieve a sustainable flow of wood products with forestlands as the primary resource, while also managing for multiple uses (i.e., watershed health and stability, wildlife, recreation, livestock grazing, etc.). Approximately 2,822 acres of aspen are managed for DPC under Alternative E.

Livestock grazing is allowed on the large majority of the planning area and is managed as described for Alternative C. For SDWs, Alternative E requires review and recommendation for revocation of withdrawals for trails that are no longer active and incorporates these lands into adjacent allotments.

Under Alternative E, renewable wind-energy development is allowed in areas identified as having outstanding/superb (power classes 6 and 7) or fair/good/excellent (power classes 3, 4, and 5) potential.

Under Alternative E, BLM maintains the four SRMAs described in Alternative A and adds two SRMAs, the Poison Spider OHV Park and National Historic Trails. The remainder of the planning area is managed as an ERMA. For BLM-administered surface land in the planning area, approximately 2,224 acres are closed to OHV use and 1,162,244 are limited to existing roads and trails for OHV use. The existing Poison Spider OHV Park (open to OHV use) is enlarged to 285 acres under Alternative E. The recreation management matrices are included in Appendix O.

Under Alternative E, lands and realty program actions within the planning area include 224,834 acres for standard disposal, 5,453 acres for restricted disposal, and 1,131,290 acres for retention (refer to the Glossary). ROW exclusion and avoidance areas encompass 981,839 acres of BLM-administered surface. Designated ROW corridors encompass 115,885 acres of BLM-administered surface.

Under Alternative E, renewable wind-energy development is allowed in areas identified as having outstanding/superb (power classes 6 and 7) or fair/good/excellent (power classes 3, 4, and 5) potential. Wind-energy development is restricted in habitat fragmentation areas under Alternative C. The area of BLM-administered surface open to renewable wind-energy development subject to avoidance limitations is 458,006 acres. The area of BLM-administered surface open to renewable wind-energy development without use limitation is 324,013 acres.

2.4.5.4 Special Designations

The existing Jackson Canyon ACEC is retained and the Alcova Fossil Area ACEC is designated under Alternative E. The existing Salt Creek Hazardous ACEC is not retained under Alternative E. Five SMAs

are established under Alternative E: (1) Bates Hole for greater sage-grouse and watershed values, (2) Salt Creek for oil and gas, (3) Sand Hills for sensitive soils, (4) South Bighorns/Red Wall for recreation and wildlife, and (5) Wind River Basin for oil and gas. The National Back Country Byways and National Historic Trails designations continue under Alternative E.

2.5 Details of Alternatives

Table 2-3 identifies goals and objectives, management actions common to all alternatives, and management actions by alternative. These are arranged according to the following resource topics:

Number	Resource Topic
1000	Physical Resources (PR)
2000	Mineral Resources (MR)
3000	Fire Management and Ecology (FM)
4000	Biological Resources (BR)
5000	Heritage and Visual Resources (HR)
6000	Land Resources (LR)
7000	Special Designations (SD)
8000	Socioeconomic Resources (SR)

The above numbering system and abbreviations for each of the eight resource topics appear as headings and serve to organize this table. Following the headings are the applicable goals and objectives for each resource topic. These goals and objectives apply to all five alternatives under consideration for the entire planning area and would apply for the life of the RMP.

Management actions are anticipated to achieve the goals and objectives identified for each resource topic. Some management actions are constant across all alternatives, whereas others vary by alternative. Management actions that apply to all alternatives are listed for each resource topic under the heading *Management Actions Common to All Alternatives* immediately following the goals and objectives for each resource topic. Management actions that vary by alternative are listed under the heading *Management Actions by Alternative*. If the action is general in nature, it is listed under the resource topic heading (e.g., physical resources, biological resources, etc.). If the action is more specific, it is listed under the individual resource (e.g., wildlife) or in some cases, the resource subcategory (e.g., big game).

The following apply under all alternatives:

- Wyoming BLM Standard Mitigation Guidelines for Surface-Disturbing and Disruptive Activities (Appendix I)
- Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming
- Best Management Practices (Appendix K).

Restrictions on resource uses apply to the life of the RMP, but can be changed by amending the RMP. For example, areas identified as closed to leasing refer to minerals deferred from leasing for the life of the RMP unless changed through an RMP amendment and public involvement. Moreover, where seasonal or other restrictions or limitations are placed on development, exception, waiver, or modification of these limitations may be approved in writing, including documented supporting analysis, by the authorized officer. This applies to all restrictions and limitations.

Table 2-3 Table of Contents

Resource Topics and Individual Resources/Uses	Page
1000 - Physical Resources	**2-27**
Air Quality	2-29
Geologic Resources	2-30
Soil	2-30
Water	2-33
2000 - Mineral Resources	**2-36**
Locatable	2-37
Leasable – Coal	2-37
Leasable – Oil and Gas	2-38
Leasable – Other Solid Leasables	2-39
Salable	2-39
3000 - Fire Management and Ecology	**2-40**
4000 - Biological Resources	**2-43**
Vegetation – Forests, Woodlands, and Forest Products	2-48
Vegetation – Grassland and Shrubland Communities	2-50
Vegetation – Riparian and Wetland Communities	2-50
Vegetation – Invasive Nonnative Plant Species and Pest Control	2-51
Fish and Wildlife Resources – Fish	2-52
Fish and Wildlife Resources – Wildlife	2-52
Special Status Species – Plants	2-54
Special Status Species – Fish	2-54
Special Status Species – Wildlife	2-54
5000 - Heritage and Visual Resources	**2-57**
Cultural Resources	2-58
Paleontological Resources	2-58
Visual Resources	2-60
6000 - Land Resources	**2-61**
Lands and Realty	2-64
Renewable Energy	2-68
Rights-of-Way and Corridors	2-69
Transportation	2-71
Off-Highway Vehicles (OHV)	2-72
Livestock Grazing	2-75
Recreation	2-77
7000 - Special Designations	**2-79**
Areas of Critical Environmental Concern and Special Management Areas	2-79
National Back Country Byways	2-95
National Historic Trails and Other Historic Trails	2-96
Wild and Scenic Rivers	2-99
8000 - Socioeconomic Resources	**2-99**
Social and Economic Conditions	2-100
Health and Safety	2-101

Table 2-3. Detailed Table of Alternatives

1000 Physical Resources (PR) – Goals and Objectives

GOAL PR:1 Minimize the impact of management actions in the planning area on air quality by complying with all applicable air quality laws, rules, and regulations.

OBJECTIVES –

PR:1.1 Comply with applicable state and federal AAQS for criteria pollutant concentration levels associated with management actions.

PR:1.2 Maintain concentrations of PSD pollutants associated with management actions in compliance with the applicable increment.

GOAL PR:2 Implement management actions within the scope of the BLM's land-management responsibilities to improve air quality as practicable.

OBJECTIVES –

PR:2.1 Reduce visibility-impairing pollutants in accordance with the reasonable progress goals and timeframes established within the State of Wyoming's Regional Haze SIP.

PR:2.2 Reduce atmospheric deposition levels below generally accepted LOC and LAC.

GOAL PR:3 Manage geologic hazards and unique geologic features on BLM-administered lands.

OBJECTIVES –

PR:3.1 Reduce potential risks associated with known geologic hazards.

PR:3.2 Maintain unique geologic features within the planning area for visual, scientific, historical, recreational, and topographic values.

GOAL PR:4 Maintain or improve soil health (e.g., chemical, physical, and biotic properties) and prevent or minimize soil erosion and compaction.

OBJECTIVES -

PR:4.1 Identify, develop, and interpret soil information to prevent or limit soil loss and to identify potential pollutant source areas.

PR:4.2 Participate in a Wyoming BLM effort in coordination with the State of Wyoming to establish guidelines in a handbook to evaluate BMPs for highly erosive soils in arid lands.

PR:4.3 Monitor and evaluate reclamation in disturbed areas and modify BMPs as needed to achieve successful reclamation.

GOAL PR:5 Maintain or improve surface water and groundwater resources consistent with applicable state and federal standards and regulations.

OBJECTIVES -

PR:5.1 Maintain watershed, wetland, and riparian functions to support surface-flow regimes and water quality.

PR:5.2 Minimize or control contributions of nonpoint source pollution from public lands to receiving water bodies, with particular attention being paid to special management waters (i.e., WQLS) established by the State of Wyoming.

PR:5.3 Improve control of sources of pollutants on federal lands that may threaten drinking-water sources.

PR:5.4 Develop, implement, and monitor restoration plans for impaired water bodies through participation with other interested stakeholders.

GOAL PR:6 Provide for physical and legal availability of water to facilitate authorized uses on public lands and to protect and provide conservation of those waters.

OBJECTIVES -

PR:6.1 Develop new water-supply sources (e.g., wells, springs, reservoirs, stream and lake access) for BLM-authorized actions (e.g., grazing, wildlife, recreation, etc.) with minimum impact to the water source as a priority.

PR:6.2 Improve opportunities for water conservation. Apply water conservation measures to all developments, where practical.

PR:6.3 Design and construct all new reservoir projects considering watershed condition, reservoir retirement, and ultimate reservoir failure.

PR:6.4 Develop and implement a procedure for conversion of abandoned oil and gas wells to livestock and wildlife water supply use.

PR:6.5 Rehabilitate nonfunctional reservoirs.

GOAL PR:7 Bring all watersheds to their full potential conditions.

OBJECTIVES -

PR:7.1 Develop water resources to improve watershed conditions.

PR:7.2 Improve protection for surface water and groundwater sources.

Table 2-3. Detailed Table of Alternatives (Continued)

1000 Physical Resources (PR) – Management Actions Common to All Alternatives						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
1001	PR:1 PR:2	Work cooperatively to develop an Air Quality Assessment Protocol to estimate potential future air quality.				
1002	PR:1	Manage prescribed burns to comply with Wyoming DEQ AQD smoke-management rules and regulations.				
1003	PR:1	Establish within 1 year of approval of the RMP ROD, an air quality strategy to define the background air quality associated with federal actions approved under this RMP.				
1004	PR:1	Create and maintain within 1 year of establishing the air quality strategy, a monitoring system to establish the air quality change over time related to federal actions.				
1005	PR:1 PR:2	Work cooperatively to encourage industry and other permittees to adopt measures to reduce emissions.				
1006	PR:1 PR:2	Work cooperatively to estimate potential impacts from potential emission reduction.				
1007	PR:1 PR:2	Ensure that the level of air quality analysis is proportional to the availability of emissions information and public concern for air quality.				
1008	PR:1 PR:2	Perform dispersion-modeling analyses to determine the potential impacts of proposed air emission mitigations.				
1009	PR:3.1	Restrict development in hazardous areas such as fault zones and slide areas; evaluate development on a case-by-case basis.				
1010	PR:3.1	Abide by the requirements of Onshore Oil and Gas Order #6, H_2S Operations, in areas containing H_2S.				
1011	PR:6.1 PR:6.3 PR:6.5 PR:6.1 PR:7.2	Provide, where authorized uses are fenced out of water sources, an alternative or “off-source” water supply (e.g., piping water to troughs, tanks, or ponds).				

Table 2-3. Detailed Table of Alternatives (Continued)

1000 Physical Resources (PR) – Air Quality						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
1012	PR:1 PR:2	Maintain existing and ambient air quality and AQRV monitoring.	Enhance existing criteria pollutant and AQRV monitoring. Locations of AQRV monitors will be determined through a cooperative process. Suggest Wyoming DEQ AQD consider adding new-criteria pollutant monitors.	Enhance existing criteria pollutant and AQRV monitoring on a project-specific or as-needed basis. Locations of AQRV monitors will be determined through a cooperative process. Suggest Wyoming DEQ AQD consider adding new criteria pollutant monitors.	Same as Alternative A.	Same as Alternative C.
1013	PR:1 PR:2	Cooperative process that shares information on proposed emission sources and air quality issues to the public and government agencies, such as the Wyoming DEQ AQD, EPA, USFS, and NPS.	Enhance the existing cooperative process that shares air quality information to agencies, stakeholders, and the public.	Same as Alternative B.	Same as Alternative B.	Same as Alternative B.
1014	PR:1 PR:2	Allow air quality impacts up to applicable standards and guidelines. The FLPMA and the Clean Air Act prohibit the BLM from conducting, supporting, approving, licensing, or permitting any activity under its jurisdiction that does not comply with all applicable local, state, tribal, and federal air quality laws, statutes, regulations, and implementation plans. A program has been developed that provides benefits to air quality and other resources by decreasing air pollutant concentrations, increasing visibility, and decreasing atmospheric depositions. The BLM works closely with the Wyoming DEQ AQD to ensure that the BLM's prescribed fire actions comply with applicable smoke-management regulations.	The BLM would consider implementing mitigations within its authority to reduce emissions from current levels in the planning area. The BLM would facilitate discussions with stakeholders to implement mitigations beyond the BLM's authority to reduce emissions from current levels in the planning area, such as: Consider a program to offset emissions proposed by the RMP. Reduce emissions from existing sources (by techniques such as more stringent Best Available Control Technologies).	The BLM would consider implementing mitigations within its authority to reduce emissions from current levels in the planning area.	Same as Alternative A.	Same as Alternative B.

Table 2-3. Detailed Table of Alternatives (Continued)

1000 Physical Resources (PR) – Geologic Resources

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
1015	PR:3.1 PR:3.2	No similar action.	Inventory, evaluate, and prioritize geologic features for degree of unique values. Develop management plans for unique geologic features based on prioritization.	On a case-by-case basis, BLM-administered lands within the planning area would be inventoried for unique geologic features, which would then be evaluated and prioritized for their unique value and a management plan would be developed.	No inventories, evaluations, or management plans will be developed for any potentially unique geologic features within the planning area.	Same as Alternative C.

1000 Physical Resources (PR) – Soil

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
1016	PR:4.1	Conduct detailed onsite soil investigations on highly controversial projects, or in areas of highly erosive soils, to evaluate the impacts of surface-disturbing activities. Onsite soil investigations may include mapping the soils to a series level, evaluating current erosion conditions, and prescribing mitigation and reclamation practices.	Conduct detailed onsite soil investigations on all surface-disturbing actions. Onsite soil investigations may include mapping the soils to a series level, evaluating current erosion conditions, and prescribing mitigation and reclamation practices.	Same as Alternative A.	Don't conduct detailed onsite soil investigations; rather, use existing soil survey information.	On BLM-administered surface, conduct onsite soil investigations on highly controversial projects, or in areas of highly erosive soils, to evaluate the impacts of surface-disturbing activities. Onsite soil investigations may include mapping the soils to a series level, evaluating current erosion conditions, and prescribing mitigation and reclamation practices.
1017	PR:4.1	Conduct an assessment of soil limitations using Soil Interpretation Rating Guides as defined in the National Soil Survey Handbook using available soil survey information. Assessments are conducted for highly controversial surface-disturbing activities, or in areas identified as having highly erosive soils. Assessments are conducted periodically at the discretion of the authorized officer, and are not applied to every authorized surface-disturbing activity.	Conduct field investigations for every surface-disturbing activity. Onsite soil investigations may include mapping the soils to a series level, collecting soil samples for physical and chemical analysis, and evaluating current erosion conditions specific to the site.	Conduct assessment of soil limitations analysis using automated soil survey or field investigations on any surface-disturbing activity causing more than 20 acres of disturbance per year. Surface-disturbing activities causing less than 20 acres of disturbance per year will be assessed as warranted.	No assessments of the soil limitations will be conducted.	Same as Alternative C.
1018	PR:4.3	The entire planning area is not routinely inventoried to determine the erosion condition of all soils on public lands. The authorized officer may conduct site-specific evaluations at his or her discretion on highly controversial projects or in areas identified as having highly erosive soils. Key areas may be evaluated as part of rangeland health evaluations to determine compliance with rangeland health standards.	Routinely inventory all public lands in the planning area to determine the rate of erosion and soil stability.	Inspect disturbed and reclaimed areas for signs of accelerated erosion on projects disturbing more than 20 acres per year. Surface-disturbing activities causing less than 20 acres of disturbance per year will be assessed as warranted.	Same as Alternative A.	Same as Alternative C.
1019	PR:4.2	Every surface-disturbing action approved by the authorized officer in the planning area is evaluated to determine the need for BMPs to minimize the impacts of the action on soil resources. Site-specific conditions are developed and applied to each specific authorization on a case-by-case basis. Development and implementation of BMPs are project specific.	NSO on highly erosive soils (575,788 acres of BLM federal mineral estate of which 256,240 acres are BLM surface).	Minimize the disturbance to highly erosive soils (575,788 acres of BLM federal mineral estate of which 256,240 acres are BLM surface). Proposed surface-disturbing activities will be modified (located) to avoid areas of highly erosive soils to the greatest extent practicable.	Allow surface-disturbing activities on highly erosive soils (575,788 acres of BLM federal mineral estate of which 256,240 acres are BLM surface).	Same as Alternative C.

Table 2-3. Detailed Table of Alternatives (Continued)

1000 Physical Resources (PR) – Soil						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
1020	PR:4.2	The requirement to use temporary protective surface treatment on disturbed areas is applied on a case-by-case basis as project conditions warrant.	Require a temporary protective surface treatment on all disturbed areas not required for operations within 30 days of completion of construction. Surface treatments will vary depending on local site conditions and changes in erosion control technology, but may include mulch, matting, netting, or tackifiers.	Same as Alternative B.	Do not require the use of protective surface treatments for surface-disturbing activities.	Same as Alternative A.
1021	PR:4.2	NSO or other surface disturbance is allowed on slopes of more than 25 percent without permission from the authorized officer. When development is proposed on slopes of more than 25 percent, engineered drawings for construction, drainage design, and final contours proposed after rehabilitation will be required.	On BLM-administered surface, NSO on slopes greater than 25 percent.	On BLM-administered surface, NSO on slopes greater than 25 percent on highly erosive soils.	Do not restrict surface-disturbing activities on slopes greater than 25 percent.	Same as Alternative A.
1022	PR:4.2	No similar action.	Prohibit the use of prescribed fire on highly erosive soils.	Limit the use of prescribed fire on highly erosive soils to seasons and fire intensity that limit impacts.	Allow the use of prescribed fire on highly erosive soils.	Same as Alternative C.
1023	PR:4.3	Every surface-disturbing action approved by the authorized officer in the planning area is evaluated to determine the need for BMPs to minimize the impacts of the action on soil resources. Site-specific conditions are developed and applied to each specific authorization on a case-by-case basis. Development and implementation of BMPs is project-specific. There is no requirement to apply BMPs to all surface-disturbing activities in the planning area.	Complete reclamation activities (final contouring, replacing topsoil, reseeding, and surface treatment) on all disturbed areas within one growing season, or implement temporary measures until the next growing season.	Complete reclamation activities (final contouring, replacing topsoil, reseeding, and surface treatment) on all disturbed areas within three growing seasons.	Complete reclamation activities (final contouring, replacing topsoil, reseeding, and surface treatment) on all disturbed areas within five growing seasons.	Same as Alternative C.
1024	PR:4.3	Every surface-disturbing action approved by the authorized officer in the planning area is evaluated to determine the need for BMPs to minimize the impacts of the action on soil resources. Site-specific conditions are developed and applied to each specific authorization on a case-by-case basis. Seed mixtures comprising native species adapted to the site may be specified by the authorized officer.	Reseed all disturbed areas with a diverse mix of native species adapted to the site conditions, including grasses, forbs, and shrubs. All seed must be certified weed-free.	Re-seed all disturbed areas with native species adapted to the site conditions and capable of providing protective soil cover. All seed must be certified weed-free. Nonnative species may be used on a case-by-case basis when resource objectives will not be met through the use of native species and the nonnative plants have no invasive properties.	Reseed all disturbed areas. Nonnative species may be used on a case-by-case basis when resource objectives will not be met through the use of native species.	Same as Alternative C, except, when practical, reseeding of disturbed areas should include the use of locally harvested seed from comparable areas in Wyoming and surrounding states.

Table 2-3. Detailed Table of Alternatives (Continued)

1000 Physical Resources (PR) – Soil						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
1025	PR:4.3	Every surface-disturbing action approved by the authorized officer in the planning area is evaluated to determine the need for BMPs to minimize the impacts of the action on soil resources. Site-specific conditions are developed and applied to each specific authorization on a case-by-case basis. Monitoring of reclamation success occurs as needed depending on the controversy of the action and available staff.	Re-treat all reclaimed areas that do not have at least 50 percent of predisturbance vegetative cover three growing seasons after final reclamation. Re-treating will vary by site and initial reclamation success, but may include invasive species control, reseeding the site with other native species or the same native species under more favorable environmental conditions. Re-treatment also may involve additions of fertilizers or soil amendments and protective cover, such as mulch, matting, or netting. Livestock grazing also may be limited until reclamation success has been established. Grazing controls will vary by site, but might include herding, fencing, deferred use, or supplemental feeding. Re-treat all reclaimed areas that do not have at least 80 percent of predisturbance vegetative cover five growing seasons after final reclamation.	Re-treat reclaimed areas that do not have at least 30 percent of predisturbance vegetative cover three growing seasons after final reclamation. Re-treating will vary by site and initial reclamation success, but may include invasive species control, reseeding the site with other native species or the same native species under more favorable environmental conditions. Re-treatment also may involve additions of fertilizers or soil amendments and protective cover, such as mulch, matting, or netting. Livestock grazing also may be limited until reclamation success has been established. Grazing controls will vary by site, but might include herding, fencing, deferred use, or supplemental feeding. Re-treat reclaimed areas that do not have at least 50 percent of predisturbance vegetative cover five growing seasons after final reclamation.	No requirements for followup reclamation work after final reclamation is complete.	Same as Alternative C.
1026	PR:4.2	On a case-by-case basis, every surface-disturbing action approved by the authorized officer in the planning area is evaluated to determine the need for BMPs to minimize the impacts of the action on soil resources. Site-specific conditions are developed and applied to each specific authorization on a case-by-case basis as well.	Require full topsoil salvage and segregation on all disturbed areas.	Allow limited or no topsoil salvage when alternative soil-handling methods may be appropriate. Some examples include salvage of topsoil on the pipeline trench only, instead of full ROW salvage, or scalping temporary work areas leaving the soil in place, followed by soil ripping when the work is completed.	Topsoil salvage and segregation will not be required.	Same as Alternative C.
1027	PR:4.2	Minimize the density of long-term surface disturbance in the planning area. Currently done on a case-by-case basis.	Limit total long-term surface disturbance from all BLM-authorized activities to no more than 80 acres per square mile. Applies to BLM surface only.	Same as Alternative B.	Place no acreage limits on total surface disturbance. Applies to BLM surface only.	Same as Alternative B.
1028	PR:4.2	Utilize all existing roads and trails regardless of the level of public demand.	Evaluate existing road and trail use in the planning area. Close and reclaim all roads and trails on BLM-administered surface that are not being utilized to meet public demand.	Evaluate existing road and trail use in the planning area. Close and reclaim all roads and trails on BLM-administered surface that are in areas designated as highly erosive soils and that are not being utilized to meet public demand.	Same as Alternative A.	Same as Alternative C.
1029	PR:4.1	The requirement to measure cumulative annual short- and long-term disturbance is applied on a case-by-case basis as project conditions warrant.	Measure the cumulative annual short- and long-term disturbance occurring as a result of BLM-authorized actions within the planning area. The areas will be mapped annually using GPS techniques and compiled in a GIS format.	Measure the cumulative annual short- and long-term disturbance occurring as a result of BLM-authorized actions within the planning area for projects that will result in more than 20 acres of disturbance annually. The areas will be mapped annually using GPS techniques and compiled in a GIS format.	BLM will not track the cumulative acreage of disturbance resulting from authorized actions.	Same as Alternative A.

Table 2-3. Detailed Table of Alternatives (Continued)

1000 Physical Resources (PR) – Water						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
1030	PR:5.1	Flow regimes currently are not managed or managed on a case-by-case basis.	On a field office level, control the number of on-channel reservoirs through project-level planning. This could involve removing existing structures or building new structures to achieve desired flow regime.	On perennial and intermittent streams, control the number of on-channel reservoirs through project-level planning. This could involve removing existing structures or building new structures to achieve desired flow regime.	Same as Alternative A.	Same as Alternative C.
1031	PR:5.1 PR:5.2 PR:5.3 PR:6.1 PR:6.3 PR:6.5	Address water quality degradation through case-by-case mitigation developed at a project level.	Analyze all management activities to prevent degradation of existing water quality.	Same as Alternative B, except applied only to activities that could impact Class 1 or 2 waters (Class 1 and 2 - Wyoming DEQ water quality standard).	Same as Alternative B, except applied only to activities that could impact Class 1 waters (Class 1 waters – Wyoming DEQ water quality standard).	Same as Alternative C, except all other waters would be addressed on a case-by-case basis.
1032	PR:5.2 PR:5.3 PR:6.1 PR:6.3 PR:7.1 PR:7.2	Require Storm Water Management Plans on all new BLM projects of more than 5 acres.	Require Storm Water Management Plans on all new BLM-controlled activities.	Require Storm Water Management Plans on all new BLM projects of more than 1 acre.	Same as Alternative C..	As determined by the authorized officer, Storm Water Management Plans would be required on all new BLM projects of more than 1 acre.
1033	PR:5.3 PR:6.1	On BLM-authorized drilling activities, evaluate on a case-by-case basis the need for requiring pitless technology.	On BLM-authorized drilling activities, require use of pitless drilling technology.	On BLM-authorized drilling activities, require use of pitless drilling technology where there is potential for adverse impact to surface water, groundwater, or soils.	Same as Alternative A.	Same as Alternative C.
1034	PR:5.1 PR:5.2 PR:5.3 PR:7.2	SWA 2: Surface Water Protection For the protection of surface water, surface development will be prohibited (NSO) in the following areas: within ¼ mile of the North Platte River; within 500 feet of live streams, lakes, reservoirs, canals, and associated riparian habitat; and within 500 feet of water wells, springs, or artesian and flowing wells. The authorized officer may waive these restrictions, including the restriction on intermittent and ephemeral streams described below, in writing if potential impacts can be acceptably mitigated. While the ¼-mile limitation does not apply to recreation facilities, it is not waived on the Trapper's Route tracts.. Surface development proposals that involve intermittent and ephemeral streams (as identified on USGS 7½ minute topographic maps) will be evaluated, and site-specific mitigation will be applied as necessary, or the development will be moved a sufficient distance to ensure natural drainage integrity. This restriction applies to intermittent streams and well-defined ephemeral streams where watershed conditions indicate that the potential exists for the stream to carry sufficient quantities of water to result in damage to surface facilities or to dike channels. This decision will be applied on a case-by-case basis. It will not apply to every topographic depression or every drainage that might conceivably carry runoff at some time; rather, it applies to drainages that have the potential to affect live streams.	NSO within 500 feet and CSU from 500 feet to ¼ mile of perennial streams, springs, riparian and wetland habitats, or water bodies (lakes, ponds). In the cases in which crossing these areas by linear facilities (pipelines, powerlines, roads, fences, etc.) is unavoidable, use best available technology and (or) BMPs to minimize impacts. Wildlife and livestock watering facilities and recreation facilities will be allowed when no other alternatives exist and only when they meet management objectives.	Same as Alternative B, except applied only on Class 1 waters – (Wyoming DEQ water quality standard) or Class 2 waters – (Wyoming DEQ water quality standard).	Same as Alternative B, except CSU within ¼ mile (no NSO).	Same as Alternative C, except waters not considered under Alternative C also would be considered on a case-by-case basis.

Table 2-3. Detailed Table of Alternatives (Continued)

1000 Physical Resources (PR) – Water						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
1035	PR:7.2	SWA 2 – Surface development will be prohibited within 500 feet of water wells, springs, or artesian and flowing wells.	NSO within 500 feet and CSU from 500 feet to ¼ mile of water wells, springs, or artesian and flowing wells.	CSU within ¼ mile of water wells, springs, or artesian and flowing wells.	CSU within 500 feet of water wells, springs, or artesian and flowing wells.	Same as Alternative D.
1036	PR:6.2	Evaluate on a case-by-case basis the need for flow-control devices on BLM-authorized water wells and spring developments.	Install flow-control devices on all wells and spring developments on BLM-administered lands within the planning area.	Install flow-control devices on all new wells and spring developments on BLM-administered lands within the planning area.	Same as Alternative A.	Same as Alternative C.
1037	PR:7.3 PR:7.4	Develop new water supplies (by preference: wells, springs, reservoirs) to disperse livestock and wildlife use.	Drill new water supply wells, develop new seeps and springs, and construct new reservoirs to BLM and state standards to disperse livestock and wildlife use on all BLM-administered lands in consultation with WGFD personnel and affected grazing lessees.	Same as Alternative B, except applied where resource damage is occurring due to concentrated ungulate use.	Same as Alternative C, except applied only where management and project plans have been developed.	Same as Alternative B, except applied only where resource damage is occurring due to ungulate use and where management and project plans have been developed. Exceptions would be granted on a case-by-case basis when determined by the authorized officer.
1038	PR:5.1 PR:5.3 PR:6.1 PR:6.3	Fence wells and reservoirs to exclude livestock and, in some cases, wildlife as issues arise. Fencing can extend the life of the development and maximize the investment (resource as well as monetary).	Fence all existing wells and multiple-use reservoirs on BLM-administered lands.	Fence all existing wells on BLM-administered lands constructed after 1995. Fence all existing multiple-use reservoirs on BLM-administered lands constructed after 1995.	Fence all new wells on BLM-administered lands. Fence all new construction multiple-use reservoirs on BLM-administered lands.	To protect water sources and associated investments, fence all wells (new and existing) and developed springs. Fencing of reservoirs would be considered on a case-by-case basis.
1039	PR:5.1 PR:6.1 PR:7.2	Rehabilitate and (or) re-develop well and spring developments and upgrade to new development practices as issues arise. Re-develop springs on BLM-administered lands when they become nonfunctional.	Rehabilitate and (or) re-develop BLM-authorized well and spring developments and upgrade to new development practices. New development practices include, but are not limited to, protection of the well/spring and facilities (fencing), provision for off-source water distribution (pipelines, troughs, tanks), water conservation measures (timers, flow control devices, preferential use of tanks and troughs over unlined pits and ponds), and use of alternative energy, where possible.	Same as Alternative B, except these measures would be applied only to well/spring developments producing 10 gallons per minute or more.	Same as Alternative B, except these measures would be applied only to well/spring developments producing 20 gallons per minute or more.	Same as Alternative C. In addition, developments producing less than 10 gallons per minute would be considered on a case-by-case basis.

Table 2-3. Detailed Table of Alternatives (Continued)

1000 Physical Resources (PR) – Water						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
1040	PR:5.3 PR:6.1 PR:6.2 PR:7.1 PR:7.2	Evaluate use of alternative energy sources (e.g., solar and [or] wind power) on a case-by-case basis.	Use alternative energy sources (e.g., solar and [or] wind power) on all new water resource developments and convert existing water-well developments to 100 percent alternative energy sources on all BLM-administered lands where economically and physically feasible.	Use alternative energy sources (e.g., solar and [or] wind power) on all new water resource developments on all BLM-administered lands where existing traditional electric power is not present and where economically and physically feasible. Convert all existing water-well developments currently using generators to alternative energy sources (e.g., solar and [or] wind power) with propane generator power as a backup only, as needed, on all BLM-administered lands where economically and physically feasible and where current operator will maintain equipment. If gasoline- or diesel-powered generators are used in place of preferred propane powered generators, periodic inspections will be made to detect fuel spills and the operator will be responsible for cleanup costs.	Use alternative energy sources (e.g., solar and [or] wind power) on all new water resource developments on all BLM-administered lands where existing traditional electric power is not feasible and where economically and physically feasible. Same as Alternative C for conversion of existing water-well developments, except that the conversion will occur as existing facilities fail.	Use alternative energy sources (e.g., solar and [or] wind power) on new water resource developments on all BLM-administered lands where existing traditional electric power is not present and where economically and physically feasible. Convert existing water-well developments currently using generators to alternative energy sources (e.g., solar and [or] wind power) with propane generator power as a backup only, as needed, on all BLM-administered lands where economically and physically feasible and where the current operator will maintain equipment. If gasoline- or diesel-powered generators are used in place of preferred propane powered generators, periodic inspections will be made to detect fuel spills and the operator will be responsible for cleanup costs.
1041	PR:5.1 PR:6.1 PR:6.4 PR:7.1	Conversion of abandoned oil and gas wells for livestock and wildlife water supply use is currently addressed on a case-by-case basis.	Convert all suitable abandoned oil and gas development water-supply wells and suitable abandoned oil and gas wells where there is a need for additional water supplies to livestock and wildlife water supply use on BLM-administered lands.	Convert all suitable abandoned oil and gas development water-supply wells to livestock and wildlife water supply use on BLM-administered lands.	Convert all suitable abandoned oil and gas development water-supply wells to livestock and wildlife water supply use on BLM-administered lands where there currently is a need for additional water supplies.	Convert suitable abandoned oil and gas development water-supply wells and suitable abandoned oil and gas wells where there is a need for additional water supplies to livestock and wildlife water supply use on BLM-administered lands.
1042	PR:5.1 PR:5.2 PR:5.3 PR:5.4 PR:6.1	Evaluate the impact of oil- and gas-produced water discharge on stream channel and stream bank stability on BLM-administered lands on a case-by-case basis. Produced water discharge originating from BLM-authorized projects will be subject to appropriate mitigation to prevent accelerated erosion or undesired stream channel adjustments. The mitigation measures may include, but are not limited to, riparian area development (i.e., vegetation establishment), evaporative pond development, and (or) re-injection of the water.	Evaluate the impacts and mitigate the adverse impacts of all proposed and existing oil- and gas-produced water discharge on stream channel and stream bank stability on all BLM-administered lands.	Same as Alternative B.	Evaluate the impacts of oil- and gas-produced water discharge on stream channel and stream bank stability in selected areas of BLM-administered lands and develop mitigation measures for future development.	Same as Alternative C.

Table 2-3. Detailed Table of Alternatives (Continued)

2000 Mineral Resources (MR) – Goals and Objectives

GOAL MR:1 Manage salable mineral permitting and development on BLM-administered lands within the planning area while minimizing impacts to other resource values.

GOAL MR:2 Manage conservation of leasable mineral resources without compromising the long-term health and diversity of public lands.

OBJECTIVES -

MR:2.1 Maintain oil and gas leasing, exploration, and development, while minimizing impacts to other resource values.

MR:2.2 Maintain coal leasing and exploration, while minimizing impacts to other resource values.

MR:2.3 Maintain opportunities to lease other solid leasable minerals, while minimizing impacts to other resource values.

MR:2.4 Facilitate the evaluation of public lands for oil and gas potential.

GOAL MR:3 Support the domestic need for energy resources.

OBJECTIVES -

MR:3.1 Maintain opportunities to explore and develop federal oil and gas resources and other leasable minerals.

MR:3.2 Maintain opportunities for the collection of subsurface geological (geophysical) data to aid in the exploration of oil and gas resources.

MR:3.3 Maintain opportunities to explore and develop coal resources within the planning area.

GOAL MR:4 Manage mining claim location, prospecting, and mining operations in a manner that will not cause unnecessary or undue degradation of public lands.

2000 Mineral Resources (MR) – Management Actions Common to All Alternatives

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
2001	MR:2.1 MR:2.2 MR:3.1	Multiple mineral development conflicts are managed on a case-by-case basis as follows: Coal leasing would be deferred in producing oil and gas fields when coal development would interfere with oil and gas operations and economic recovery of the oil and gas resource; conventional oil and gas drilling and production activities would not be authorized when there are conflicts with coal mining; BLM WO IM-2003-253 would guide CBNG and coal mining conflicts; and all federal coal lands with mining claims would be acceptable for coal development and consideration for coal leasing, subject to valid existing rights.				
2002	MR:2.1 MR:3.1	Oil and gas leasing will be subject to the Wyoming BLM standard lease form. Changes to the standard lease form would be incorporated into the RMP by plan maintenance.				
2003	MR:2.1 MR:3.1	Oil and gas lease applications will be considered on a case-by-case basis. Leases will be issued with the least restrictive stipulations needed to protect other resource values. Stipulations to protect important resource values will be based on interdisciplinary review of individual proposals and environmental analysis.				
2004	MR:2.3 MR:3.1	The Casper Field Office is open to mineral leasing, including solid leasables and geothermal, unless specifically closed to mineral leasing. These open areas will be managed on a case-by-case basis.				
2005	MR:2.3 MR:3.1	Acquired mineral estate administered by the BLM would be open to mineral leasing for other leasables, including phosphate, sodium, potassium, sulfur, gilsonite, bentonite, uranium, and hard rock locatable minerals, unless specifically closed to mineral leasing.				
2006	MR:2.3 MR:3.1	Those areas open to oil and gas leasing also would be open to leasing of other leasable minerals.				
2007	MR:1	Where possible, the routing of access roads will be made in conjunction with the surface owner.				
2008	MR:1	Mineral material sales are discretionary actions; therefore, disposal would be considered on a case-by-case basis. Stipulations to protect important resource values would be based on interdisciplinary review of individual proposals.				
2009	MR:2.2 MR:3.3	Lands within the planning area boundaries are open to coal exploration through the coal exploration license process.				
2010	MR:2.2 MR:3.3	On existing coal leases, stipulations to new oil and gas leases to resolve oil and gas/coal conflicts would be applied. On current LBAs, oil and gas leasing would be deferred until the LBA lease is issued.				

Table 2-3. Detailed Table of Alternatives (Continued)

2000 Mineral Resources (MR) – Locatable						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
2011	MR:4	BLM-administered mineral estate, except areas identified as necessary for the protection of specific resource values or uses, will be open for prospecting for and development of locatable minerals. Under this alternative 530,120 acres are withdrawn from locatable mineral entry. Of these 530,120 acres, 488,531 acres are BLM withdrawals and 41,589 aces are other Federal Agency withdrawals.	BLM-administered mineral estate, except areas identified as necessary for the protection of specific resource values or uses, will be open for prospecting for and development of locatable minerals. Under this alternative, 2,302,086 acres are withdrawn from locatable mineral entry. Of these 2,302,086 acres, 2,253,132 acres are BLM withdrawals and 48,954 aces are other Federal Agency withdrawals.	BLM-administered mineral estate, except areas identified as necessary for the protection of specific resource values or uses, will be open for prospecting for and development of locatable minerals. Under this alternative, 1,363,510 acres would be withdrawn from locatable mineral entry. Of these 1,363,510 acres, 1,314,556 acres are BLM withdrawals and 48,954 aces are other Federal Agency withdrawals.	BLM-administered mineral estate, except areas identified as necessary for the protection of specific resource values or uses, will be open for prospecting for and development of locatable minerals. Under this alternative, 87,509 acres would be withdrawn from locatable mineral entry. Of these 87,509 acres, 52,243 acres are BLM withdrawals and 35,266 aces are other Federal Agency withdrawals.	BLM-administered mineral estate, except areas identified as necessary for the protection of specific resource values or uses, will be open for prospecting for and development of locatable minerals. Under this alternative, 627,653 acres would be withdrawn from locatable mineral entry. Of these 627,653 acres, 578,699 acres are BLM withdrawals and 48,954 aces are other Federal Agency withdrawals.

2000 Mineral Resources (MR) – Leasable: Coal						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
2012	MR:2.2 MR:3.3	No current management action exists for leasing lands outside the CDPA.	No coal development will be considered on BLM-administered lands outside the CDPA. These lands will be considered unacceptable for further consideration for coal leasing.	Same as Alternative B.	If coal development potential is shown to exist, all BLM-administered lands outside the CDPA will be considered for coal leasing, unless specifically closed to mineral leasing. The coal-screening process will be completed on all newly identified lands having coal development potential.	Same as Alternative D.
2013	MR:2.2 MR:3.3	All BLM-administered lands within the CDPA identified in the 2001 Buffalo RMP maintenance action would be acceptable for further consideration for coal leasing.	All BLM-administered lands within the CDPA identified in the 2001 Buffalo RMP maintenance action would be considered unacceptable for further consideration for coal leasing.	Same as Alternative B.	All BLM-administered lands within the CDPA identified in the 2001 Buffalo RMP maintenance action would be acceptable for further consideration for coal leasing. The only exceptions are those lands determined unacceptable within the area. The coal unsuitability criteria are re-evaluated whenever new coal lease applications are received.	Same as Alternative D.

Table 2-3. Detailed Table of Alternatives (Continued)

2000 Mineral Resources (MR) – Leasable: Oil and Gas						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
a. Areas open to leasing, subject to the terms and conditions of the standard lease form.						
2014	MR:2.1 MR:3.1	1,136,855 acres of federal oil and gas lease mineral estate are open to leasing consideration and subject to the terms and conditions of the standard lease form only.	446,019 acres of federal oil and gas lease mineral estate are open to leasing consideration and subject to the terms and conditions of the standard lease form only.	1,012,656 acres of federal oil and gas lease mineral estate are open to leasing consideration and subject to the terms and conditions of the standard lease form only.	1,524,375 acres of federal oil and gas lease mineral estate are open to leasing consideration and subject to the terms and conditions of the standard lease form only.	1,080,935 acres of federal oil and gas lease mineral estate are open to leasing consideration and subject to the terms and conditions of the standard lease form only.
b. Areas open to leasing, subject to moderate constraints, such as seasonal restrictions.						
2015	MR:2.1 MR:3.1	2,711,404 acres of federal oil and gas lease mineral estate are open to leasing consideration and subject to the terms and conditions of the standard lease form, as well as moderate constraints.	1,196,922 acres of federal oil and gas lease mineral estate are open to leasing consideration and subject to the terms and conditions of the standard lease form, as well as moderate constraints.	2,058,162 acres of federal oil and gas lease mineral estate are open to leasing consideration and subject to the terms and conditions of the standard lease form, as well as moderate constraints.	2,445,107 acres of federal oil and gas lease mineral estate are open to leasing consideration and subject to the terms and conditions of the standard lease form, as well as moderate constraints.	2,506,530 acres of federal oil and gas lease mineral estate are open to leasing consideration and subject to the terms and conditions of the standard lease form, as well as moderate constraints.
c. Areas open to leasing, subject to major constraints, such as NSO stipulations, on an area more than 40 acres in size or more than ¼ mile in width. These are areas where it has been determined that highly restrictive lease stipulations are required to mitigate impacts to other lands or resource values. This category also includes areas where overlapping minor constraints would severely limit development of oil and gas resources.						
2016	MR:2.1 MR:3.1	770,991 acres of federal oil and gas lease mineral estate are open to leasing consideration and subject to the terms and conditions of the standard lease form, as well as major constraints.	2,296,267 acres of federal oil and gas lease mineral estate are open to leasing consideration and subject to the terms and conditions of the standard lease form, as well as major constraints.	1,113,078 acres of federal oil and gas lease mineral estate are open to leasing consideration and subject to the terms and conditions of the standard lease form, as well as major constraints.	662,664 acres of federal oil and gas lease mineral estate are open to leasing consideration and subject to the terms and conditions of the standard lease form, as well as major constraints.	843,139 acres of federal oil and gas lease mineral estate are open to leasing consideration and subject to the terms and conditions of the standard lease form, as well as major constraints.
d. Areas closed to leasing. These are areas where it has been determined that other land uses or resource values can not be adequately protected with even the most restrictive lease stipulations; appropriate protection can be assured only by closing the lands to leasing. BLM would identify whether such closures are discretionary or nondiscretionary.						
2017	MR:2.1 MR:3.1	37,922 acres of federal oil and gas lease mineral estate are closed to leasing.	717,964 acres of federal oil and gas lease mineral estate are closed to leasing.	473,276 acres of federal oil and gas lease mineral estate are closed to leasing.	25,026 acres of federal oil and gas lease mineral estate are closed to leasing.	226,568 acres of federal oil and gas lease mineral estate are closed to leasing.
2018	MR:2.1 MR:3.1	Directional drilling would be required on a case-by-case basis to protect other resource values.	Same as Alternative A.	Same as Alternative A.	Directional drilling would not be required.	Same as Alternative A.
Oil and Gas Geophysical Operations						
2019	MR:2.1 MR:2.4	Those lands currently open to oil and gas leasing would continue to be open to geophysical operations. Those lands open to oil and gas leasing, but subject to an NSO restriction, may be open to geophysical operations should site specific NEPA analysis disclose a finding of no significant impact. No geophysical operations would be allowed in areas closed to oil and gas leasing.	Same as Alternative A, except geophysical operations on public surface would not be allowed in areas containing an NSO restriction.	Same as Alternative B.	The entire planning area would be open for geophysical operations on public surface.	Same as Alternative A.

Table 2-3. Detailed Table of Alternatives (Continued)

2000 Mineral Resources (MR) – Leasable: Other Solid Leasables						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
2020	MR:2.3 MR:3.1	BLM-administered mineral estate, except areas identified as necessary for the protection of specific resource values or uses, will be open to leasing of other solid leasable minerals. Under this alternative, 37,922 acres would be closed to leasing of other solid leasable minerals.	BLM-administered mineral estate, except areas identified as necessary for the protection of specific resource values or uses, will be open to leasing of other solid leasable minerals. Under this alternative, 717,964 acres would be closed to leasing of other solid leasable minerals.	BLM-administered mineral estate, except areas identified as necessary for the protection of specific resource values or uses, will be open to leasing of other solid leasable minerals. Under this alternative, 473,276 acres would be closed to leasing of other solid leasable minerals.	BLM-administered mineral estate, except areas identified as necessary for the protection of specific resource values or uses, will be open to leasing of other solid leasable minerals. Under this alternative, 25,026 acres would be closed to leasing of other solid leasable minerals.	BLM-administered mineral estate, except areas identified as necessary for the protection of specific resource values or uses, will be open to leasing of other solid leasable minerals. Under this alternative, 226,568 acres would be closed to leasing of other solid leasable minerals.

2000 Mineral Resources (MR) – Salable						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
2021	MR:1	BLM-administered mineral estate, except areas identified as necessary for the protection of specific resource values or uses, will be open to the disposal of mineral materials. Under this alternative, 52,576 acres would not be available for disposal of mineral materials.	BLM-administered mineral estate, except areas identified as necessary for the protection of specific resource values or uses, will be open to the disposal of mineral materials. Under this alternative, 673,797 acres would not be available for disposal of mineral materials.	BLM-administered mineral estate, except areas identified as necessary for the protection of specific resource values or uses, will be open to the disposal of mineral materials. Under this alternative, 301,933 acres would not be available for disposal of mineral materials.	BLM-administered mineral estate, except areas identified as necessary for the protection of specific resource values or uses, will be open to the disposal of mineral materials. Under this alternative, 43,344 acres would not be available for disposal of mineral materials.	BLM-administered mineral estate, except areas identified as necessary for the protection of specific resource values or uses, will be open to the disposal of mineral materials. Under this alternative, 665,570 acres would not be available for disposal of mineral materials.

Table 2-3. Detailed Table of Alternatives (Continued)

3000 Fire Management and Ecology (FM) – Goals and Objectives	
GOAL FM:1 Manage wildland fire and fuels for the protection of public health, safety, property, and resource values. **OBJECTIVES -** **FM:1.1** Manage hazardous fuels in areas of urban and industrial interface to reduce potential of loss due to catastrophic fire (10-year comprehensive strategy). **FM:1.2** Maintain a desired mix of seral stages within the following vegetation communities: • Desert shrublands • Forest and woodlands • Grasslands • Mountain shrublands • Sagebrush (all subspecies) • Riparian/wetland areas • Aspen. **FM:1.3** Manage vegetation communities to maintain areas in Condition Class 1. Those vegetation communities in Condition Classes 2 and 3 will be managed to restore such communities toward Condition Class 1.	**GOAL FM:2** Conduct appropriate emergency stabilization and rehabilitation when and where needed.

3000 Fire Management and Ecology (FM) – Management Actions Common to All Alternatives						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
3001	FM:1 FM:2	National Fire Suppression Guidelines and the current Fire Management Plan for the Eastern Wyoming Zone will guide fire suppression on public lands.				
3002	FM:1	During fire suppression, a resource advisor will be consulted or be assigned to all wildland fires that involve or threaten public lands.				
3003	FM:1	Use of retardant or foam within 300 feet of surface water sources would be prohibited.				

Table 2-3. Detailed Table of Alternatives (Continued)

3000 Fire Management and Ecology (FM)						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
3004	FM:1.1 FM:1.2	**FM2 – Heavy Equipment Use** Heavy equipment will not be used to construct firelines in areas containing wagon ruts of the Oregon and Bozeman trails. Cultural resource specialists or area resource specialists will be consulted for locations of identified wagon ruts before the use of or anticipated use of heavy equipment. Exceptions may be permitted for the protection of human life. Heavy equipment generally will not be used to construct firelines in elk critical winter range. The Platte River Resource Area wildlife biologist will be consulted when fires threaten elk critical winter range. If heavy equipment is used, rehabilitation work on lines will begin immediately after the fire is declared out. **FM3 – Fire Suppression in Bald Eagle Roost Areas** To the extent possible, trees will not be cut during fire suppression in bald eagle roost areas or within 200 yards of the roosts on Casper Mountain (Jackson Canyon and little Red Creek) and Pine Mountain. Exceptions will be permitted, when necessary, to control fires that threaten human life and (or) property. The Platte River Resource Area wildlife biologist will be consulted when fires threaten the bald eagle roost areas.	Appropriate management response will be used on all wildfires in the planning area. Full protection strategies and tactics will be used in the following areas: • WUI • Wildland industrial interface • Developed recreation sites • Developed electronics sites of all types In all other areas appropriate management response strategies and tactics will be determined by (but not limited to) the following: • Firefighter and public safety • Resource values at risk • Proximity to private land • Firefighting resource availability Tactical constraints follow: • The use of retardant within 300 feet of surface water (standing or running) is prohibited. • No trees are to be cut during suppression activities within 200 yards of an identified bald eagle roost. • No heavy equipment will be used within the following areas, except when human safety is at risk: ▪ Areas of cultural resource sensitivity ▪ Riparian/wetland habitats ▪ Big game crucial winter range habitats ▪ Sage-grouse leks ▪ Areas of highly erosive soils In areas not identified as full protection, heavy equipment usage will be limited to existing roads and trails or immediately adjacent to them.	Same as Alternative B, except there would be no full protection areas and use of heavy equipment in areas of highly erosive soils would be subject to a CSU restriction.	Full protection strategies and tactics would be used across the entire planning area.	Same as Alternative B.
3005	FM:1.1 FM:1.2	No similar action. In areas where a prescribed fires is planned, Appropriate Management Response (AMR) will be used if a wildland fire is meeting the stated resource management objectives of the prescribed fire project. This AMR will emphasize containment within the Project Area/Allowable area as developed in the prescribed fire plan.	**Fire Use Guidelines** Natural ignitions within an area with a wildland fire-use plan for resource benefit would be allowed to proceed within a defined area under prescriptive guidelines to meet the desired management objectives. Wildland-fire use plans would be developed as opportunities arise for public lands within aspen, juniper, and true mountain mahogany communities where contiguous public lands are greater than 160 acres. To implement fire use on a landscape scale, cooperative agreements would be pursued with private landowners and the State of Wyoming.	**Fire Use Guidelines** Same as Alternative B. Wildland-fire use plans would be developed as opportunities arise for public lands within aspen, juniper, lodgepole pine, and true mountain mahogany communities where contiguous public lands are greater than 640 acres.	**Fire Use Guidelines** Same as Alternative B. Wildland-fire use plans would be developed as opportunities arise for public lands within aspen, juniper, lodgepole pine, true mountain mahogany, ponderosa pine, and big sagebrush (all subspecies) communities where contiguous public lands are greater than 1,280 acres.	**Fire Use Guidelines** Same as Alternative D, with the following addition: The BLM would pursue creating cooperative agreements with willing adjacent landowners, local governments, or land management agencies that wish to participate.

Table 2-3. Detailed Table of Alternatives (Continued)

3000 Fire Management and Ecology (FM)						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
3006	FM:1.1 FM:1.2	**FM1 – Prescribed Burning** Prescribed burning will be implemented to manipulate vegetation on areas identified for treatment in the range, forestry, and wildlife programs. WL6 - No prescribed burning within bald eagle roost areas from November 1 to March 31.	**Management Ignited Prescribed Fire** Use prescribed burning to achieve measurable landscape level objectives from (1) other resources, including, but not limited to, forestry, wildlife, range, vegetation, and watershed; (2) the reduction of hazardous fuels; and (3) the introduction of fire into fire-adapted ecosystems.	**Management Ignited Prescribed Fire** Same as Alternative B.	**Management Ignited Prescribed Fire** Same as Alternative B.	**Management Ignited Prescribed Fire** Same as Alternative B, except "landscape level" would be changed to "5th order watershed."
3007	FM:2	**FM4 – Rehabilitation and Stabilization Following Wildland Fire** While there are no specific plan decisions, rehabilitation and stabilization following wildland fires will be conducted on a case-by-case basis.	Rehabilitate suppression-related damage, which includes chemical treatment where INPS invade.	Rehabilitate all fires on public lands, including damage from suppression activities and fire severity. Rehabilitation includes chemical treatment where INPS invade.	Evaluate all fires and rehabilitate, as needed, for suppression and fire-severity impacts. Chemical treatment where INPS invade would be used to rehabilitate.	Same as Alternative D.
3008	FM:1.1 FM:1.2	No similar action.	**Fuels Management** Utilize an integrated management technique approach (defined as prescribed fire, mechanical, chemical, or biological, followed by desired reseeding) to reduce fuels to protect high priority areas or resource values defined as, but not limited to the following: • Urban and industrial interface areas • Developed recreation areas • Commercial timber areas • Sensitive wildlife habitats • Range-improvement facilities • Communication sites • Municipal watersheds.	**Fuels Management** Same as Alternative B.	**Fuels Management** Same as Alternative B.	**Fuels Management** Same as Alternative B, except "sensitive wildlife habitats" would be changed to "wildlife habitats."
3009	FM:1.1 FM:1.2	No similar action.	Allow fuel-management activities on R&PP leases/conveyances to reduce fuel loads so the threat or impacts from wildfires is minimized.	Same as Alternative B.	Same as Alternative B.	Same as Alternative B.

Table 2-3. Detailed Table of Alternatives (Continued)

4000 Biological Resources (BR) -- Goals and Objectives

GOAL BR:1 Manage for the biological integrity of terrestrial and aquatic ecosystems to sustain vegetation, fish, wildlife, and special status species, while providing for multiple uses of BLM-administered lands.

OBJECTIVES -

BR:1.1 Maintain a diversity and distribution of plant species, habitats, seral stages, and types (e.g., age, structure, cover classes, density), including forests and woodlands, grasslands, mountain shrublands, sagebrush (all subspecies), riparian/wetland areas, and desert shrublands.

BR:1.2 Maintain forest stands at optimal stand health (considering density, basal area, canopy cover, age classes, and understory) by maintaining properly functioning communities.

BR:1.3 . Old growth stands or those to be managed for old growth will follow the HFRA (2003) section 102 for maintaining and managing those stands.

BR:1.4 Maintain sustainable forage levels for livestock and wildlife habitats.

BR:1.5 Emphasize the use of mechanical, chemical, and biological methods, as well as fire and livestock grazing, to achieve DFC.

BR:1.6 Maintain internal (BLM) and external support for managing INPS using an integrated approach for the detection, control, or eradication of new infestations.

BR:1.7 Continue coordination of INPS detection and control activities across jurisdictional and political boundaries and include provisions for INPS management for all BLM-funded or authorized actions.

BR:1.8 Maintain adequate baseline information regarding the extent and control of INPS to make informed decisions, evaluate effectiveness of management actions, and assess progress toward goals to improve INPS management.

BR:1.9 Manage lotic and lentic wetland/riparian areas toward PFC.

BR:1.10 Work with the WGFD to identify and improve fish and known special status fish passage and floodplain connectivity.

BR:1.11 Maintain an estimated 3.7 miles of Blue Ribbon streams.

BR:1.12 Maintain and improve an estimated 21.7 miles of Red and Yellow Ribbon streams.

BR:1.13 Maintain or improve habitats for introduction or reintroduction of fish species to existing and new reservoirs.

BR:1.14 Maintain or improve the continuity and productivity of wildlife habitats to support the WGFD wildlife population objectives.

BR:1.15 Maintain and improve seasonal habitats (e.g., concentration areas, migration corridors, etc.) of fish, wildlife, and special status species on a landscape scale.

BR:1.16 Identify and implement opportunities in coordination with the WGFD to introduce or reintroduce wildlife species to areas managed under activity plans.

BR:1.17 Maintain special status species plant communities in natural patterns on a landscape scale and maintain special status plant species' habitats in PFC, including natural diversity (i.e., composition and mosaics) and recognizing the impacts of natural processes (i.e., fire).

BR:1.18 Maintain identified high priority habitat in Shirley Basin black-footed ferret re-introduction area.

GOAL BR:2 Manage all BLM actions or authorized activities to sustain plant, fish, and wildlife populations and their habitats and to avoid contributing to the listing of or jeopardizing the continued existence or recovery of special status species and their habitats.

OBJECTIVES -

BR:2.1 Minimize adverse impacts and mitigate unavoidable impacts to plant, fish, wildlife, and special status species and their habitats from BLM actions and authorized activities.

BR:2.2 Maintain an estimated 4.7 miles of fishery containing federally listed or Wyoming NSS1 species.

BR:2.3 Maintain or improve an estimated 69.5 miles of fishery containing other federal candidate, BLM sensitive, or Wyoming NSS2 and NSS3 species.

BR:2.4 Identify and implement opportunities in coordination with the WGFD to reintroduce special status aquatic species in streams.

GOAL BR:3 Manage environmental risks and associated impacts in a manner compatible with sustaining plant, fish, wildlife, and special status species populations. Environmental risks include, but are not limited to, parasites, diseases, insect outbreaks, catastrophic fires, contamination, pesticides, rodenticides, herbicides, and other hazards.

OBJECTIVES -

BR:3.1 Minimize adverse impacts of environmental risks on plant, fish, wildlife, and special status species.

BR:3.2 Manage pesticide, rodenticide, and herbicide application in a manner compatible with fish, wildlife, and special status species' health.

BR:3.3 Coordinate with other agencies to prevent or control diseases that threaten the health of humans, wildlife, livestock, and vegetation.

BR:3.4 Coordinate with other agencies to manage native and nonnative predatory animals that pose a threat to the health or productivity of natural ecosystems.

GOAL BR:4 Manage terrestrial and aquatic ecosystems to provide sustainable recreational and educational benefits to the public.

OBJECTIVES -

BR:4.1 Improve public awareness and support, including partnerships, for the conservation, restoration, and management of vegetation, fish, wildlife, and special status species programs.

BR:4.2 Provide wildlife and wildlife habitat outreach and educational materials to the public on an annual basis.

Table 2-3. Detailed Table of Alternatives (Continued)

4000 Biological Resources (BR) – Management Actions Common to All Alternatives						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
4001	BR:1.10 BR:1.11 BR:1.12 BR: 2.1	Utilize current research, management and conservation plans, and other research and related directives (i.e., BLM IMs, MOUs, WGFD objectives), as appropriate, to guide habitat management for vegetation, fish, wildlife, and special status species (Appendix B).				
4002	BR:1.3 BR:1.9 BR:1.14 BR:2.1	Use produced water, where reasonable and practical, to develop and enhance waterfowl and special status species waterfowl habitats.				
4003	BR:1.2 BR:1.5 BR:1.7 BR:2.1	Apply, where surface development or disturbance occurs, appropriate mitigation measures to minimize impacts to vegetative resources. Emphasize the use of native plants appropriate to the site for reclamation activities. Nonnative species may be used on a case-by-case basis when resource objectives will not be met through the use of native species.				
4004	BR:1.11 BR:1.12 BR:1.14 BR:1.15 BR:1.17 BR:4.1 BR:4.2 BR:4.3	Develop a drought contingency plan to maintain adequate habitat components for viable fish, wildlife, and special status species populations.				
4005	BR:1.14 BR:1.15 BR:1.16	Develop water sources for wildlife and special status species in coordination with the WGFD and the BLM Water Development Handbook (H-1741-2).				
4006	BR:1.1 BR:1.2 BR:1.3 BR:1.4 BR:1.5 BR:1.14 BR:1.15 BR:2.1 BR:3.1 BR:3.3	The NSO restriction to protect sage-grouse habitats would not apply to prescribed fire, which would be used as a tool to meet management objectives. Prescribed fire would be subject to CSU and TLS restrictions with exceptions granted on a case-by-case basis after site-specific analysis and occasional adverse impacts.				
4007	BR:1.9	Manage lotic and lentic wetland/riparian areas toward PFC.				
4008	BR:1.6 BR:1.7 BR:1.8	Manage actively, where INPS occurs, to contain or eradicate them using an integrated management approach and cooperative agreements with county weed and pest control districts, industry, and private landowners across all vegetative communities.				
4009	BR:1.1 BR:1.2 BR:1.5 BR:1.7 BR:1.9 BR:1.14 BR:1.15	Utilize an integrated management approach (i.e., mechanical, chemical, biological, prescribed fire, or livestock grazing) to manipulate seral stages within vegetative communities to achieve objectives defined by the range, forestry, wildlife, watershed, and INPS programs.				
4010	BR:1.6 BR:1.7 BR:4.1	Modify identified hazard fences and construct new fences in accordance with the BLM Fencing Handbook 1741-1.				
4011	BR:1.6	Work with APHIS to control outbreaks of grasshoppers and Mormon crickets on public lands in the planning area in accordance with the MOU between USDI and APHIS.				

Table 2-3. Detailed Table of Alternatives (Continued)

4000 Biological Resources (BR) – Management Actions Common to All Alternatives						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
4012	BR:2.1	Carry existing HMPs forward. As specified in the Bald Eagle HMP, all roosts outside the Jackson Canyon ACEC would be withdrawn from locatable mineral entry and closed to disposal of mineral materials. Develop, revise, update, and consolidate HMPs to include management objectives and prescriptions for wildlife.				
4013	BR:1.15	Prohibit surface development on public lands in an area from ¼- to 1-mile of known or discovered bald eagle nests. The specific distance and dimensions of the area on which surface development will be prohibited will be determined on a case-by-case basis after consultation with the USFWS in accordance with the ESA.				
4014	BR:1.14 BR:4.1	Prohibit surface development on certain parcels of Muddy Mountain elk crucial winter range.				

4000 Biological Resources (BR)						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
4015	BR:1.1 BR:1.10 BR:1.11 BR:1.12 BR:1.13 BR:1.15 BR:1.16 BR:1.17 BR:2.1 BR:2.2 BR:2.3 BR:2.4 BR:4.1	Manage toward PFC on 350 miles of lotic and adjacent riparian habitat and 10,000 acres of lentic habitat to meet fish, wildlife, and special status species habitat requirements.	Manage toward DPC on 350 miles of lotic and adjacent riparian habitat and 10,000 acres of lentic habitat to meet fish, wildlife, and special status species habitat requirements.	Manage toward DPC on 175 miles of lotic and adjacent riparian habitat and 5,000 acres of lentic habitat to meet fish, wildlife, and special status species habitat requirements.	Manage toward DPC on 88 miles of lotic and adjacent riparian habitat and 2,500 acres of lentic habitat to meet fish, wildlife, and special status species habitat requirements.	Same as Alternative B, except manage toward PFC and identified DPC.
4016	BR:1.10 BR:1.12 BR:1.14 BR:2.2 BR:2.3 BR:4.1	No similar action.	Improve floodplain connectivity and function of 350 stream miles.	Improve floodplain connectivity and function of 108 stream miles.	Improve floodplain connectivity and function of 75 stream miles.	Same as Alternative D.
4017	BR:1.10 BR:1.14 BR:2.1 BR:2.3 BR:4.1	No similar action.	Restore 108 miles of incised streams and 90 acres of lentic habitat.	Restore 75 miles of incised streams and 47 acres of lentic habitat.	Restore 33 miles of incised streams and 43 acres of lentic habitat.	Same as Alternative D.

Table 2-3. Detailed Table of Alternatives (Continued)

4000 Biological Resources (BR)						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
4018	BR:1.10 BR:1.11 BR:1.12 BR:1.13 BR:1.14 BR:2.1 BR:2.2 BR:2.3 BR:2.4 BR:4.1 BR:4.2	Water rights of all new projects are obtained by the BLM from the State of Wyoming. Existing BLM projects needing water rights are obtained by the BLM from the State of Wyoming on a case-by-case basis.	Water rights will be pursued for the benefit of fisheries, wildlife, and special status species habitats.	Same as Alternative B.	Same as Alternative A.	Same as Alternative B, except no water rights can be obtained for in-stream flow, since that right is reserved for the State of Wyoming.
4019	BR:1.10 BR:1.11 BR:1.13 BR:1.14 BR:2.1 BR:4.1 BR:4.2	Water sources for fisheries, waterfowl, and special status species waterfowl are developed opportunistically (estimated 1,500 acres currently exist).	Develop an estimated 1,000 acres of surface water for fish, waterfowl, and special status species waterfowl.	Develop an estimated 500 acres of surface water for fish, waterfowl, and special status species waterfowl.	Develop an estimated 100 acres of surface water for fish, waterfowl, and special status species waterfowl.	Same as Alternative A, except with a focus on developing an additional 100 acres of surface water for fish, waterfowl, and special status species waterfowl.
4020	BR:1.14 BR:2.1 BR:3.1 BR:3.2 BR:4.1	Mitigation is developed on a case-by-case basis for project-level activities.	Utilize Wyoming Game and Fish Commission Mitigation Policy as a guideline for developing mitigation for project-level activities.	Utilize a full range of mitigation options (including offsite mitigation) when developing mitigation for project-level activities for wildlife and special status species habitats.	Same as Alternative C.	Same as Alternative C.
4021	BR:1.15	**Table Mountain, Springer/Bump-Sullivan, and Rawhide** Table Mountain HMP (1977; 1,540 acres; waterfowl, upland game, fisheries habitats, and birding) – manage in cooperation with the WGFD. Springer/Bump-Sullivan HMP (1966; 600 acres; waterfowl, upland game, and fisheries habitats) – manage in cooperation with WGFD. Rawhide HMP (1986; 200 acres; waterfowl and upland game habitats and birding) – manage in cooperation with the WGFD (no cooperative agreement has been developed yet). A protective withdrawal will be established on the Table Mountain and Springer/Bump-Sullivan HMP areas (2,018 acres of BLM-administered lands). The withdrawal will segregate from operation of the public land laws, including the mining laws, but not the mineral-leasing laws. The existing C&MU classification will be terminated. The BLM will pursue acquisition of lands and interest in lands in the Table Mountain area.	**Table Mountain, Springer/Bump-Sullivan, and Rawhide** Same as Alternative A. A protective withdrawal will be established on the Table Mountain and Springer/Bump-Sullivan HMP areas (2,018 acres of BLM-administered lands) and on the Rawhide HMP area (183 acres) (total of 2,201 acres). The withdrawal will segregate from operation of the public land laws, including the mining laws, but not the mineral-leasing laws. The existing C&MU classification will be terminated.	**Table Mountain, Springer/Bump-Sullivan, and Rawhide** On a short-term basis, continue existing management of the Table Mountain, Springer/Bump-Sullivan, and Rawhide HMP areas. Within 5 years, transfer management to the WGFD through disposal. If not disposed of to the WGFD within 5 years, make available for disposal to other agencies/organizations that will manage the lands for wildlife habitat and public recreation. In concert with the disposal action, revoke the C&MU classification and do not withdraw these areas. The BLM will not pursue acquisition of lands and interest in lands in the Table Mountain area.	**Table Mountain, Springer/Bump-Sullivan, and Rawhide** Same as Alternative C.	**Table Mountain, Springer/Bump-Sullivan, and Rawhide** Same as Alternative C.
4022	BR:4.1	Obtain access to areas identified below. Table Mountain	No similar action.	Same as Alternative B.	Same as Alternative B.	Negotiate easements, where needed, to meet program needs. These needs would be identified on a case-by-case basis.

Table 2-3. Detailed Table of Alternatives (Continued)

4000 Biological Resources (BR) – Vegetation						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
Management Actions Applicable to All Vegetation						
4023	BR:1.14 BR:4.1	No similar action.	Areas currently identified with low development potential for coal and oil and gas resources with public surface ownership greater than 50 percent, would be managed to retain intact blocks of native vegetation where contiguous acreage of greater than 10,000 acres is present (63% or 660,498 acres, of which 413,552 are BLM-administered surface). In these areas, the following restrictions would apply: a. These blocks (1 through 16) would be (1) closed to oil and gas leasing and (2) a geophysical operation on public surface. Activities for existing oil and gas leases would be managed intensively (see Appendix U). Existing leases would be allowed to expire and not be renewed. b. These blocks would be withdrawn from the operation of the public land laws related to locatable minerals. c. These blocks would be closed to mineral material disposal. Existing permits would be allowed to expire without renewal or expansion. d. These blocks would not be open to wind/renewable energy development. e. These blocks would remain open to livestock grazing. f. CSU within areas containing big game crucial winter range and NSO within a ½-mile radius of sage-grouse leks, except for vegetative/ silviculture treatments, INPS control, and fuels management. Maintenance of existing facilities would be allowed. In areas outside of big game crucial winter ranges or outside a ½-mile radius of sage-grouse leks, all surface-disturbing activities would be subject to CSU stipulations that would result in the least amount of disturbance and be consistent with fragmentation objectives. ROW and similar facilities would be located adjacent to other facilities in corridor fashion, where practical.	Same as Alternative B, except the restrictions would apply only to those blocks (3, 5, 8, 11, 13, 14 15, 16) containing large areas of important big game crucial winter range or sage-grouse leks/habitats (63 percent or 279,305 acres, of which 177,035 acres are BLM-administered surface).	Restrictions to protect habitat fragmentation would not apply.	Same as Alternative C, except the boundaries in blocks 3, 5, 8, 11, and 16 would be adjusted and only restrictions a through e would apply. All allowed surface-disturbing activities within the adjusted blocks would be subject to a CSU stipulation, minimizing surface disturbance to meet management objectives (68 percent or 195,545 acres, of which 131,879 acres are BLM-administered surface).

Table 2-3. Detailed Table of Alternatives (Continued)

4000 Biological Resources (BR) – Vegetation						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
Forests, Woodlands, and Forest Products						
4024	BR:1.1 BR:1.2	The direction provided by the Healthy Forests Restoration Act of 2003, the Healthy Forests Initiative and the 10 Year Comprehensive Strategy will be followed. Old growth stands will be identified and maintained or restored to pre-suppression conditions. Large tree retention will be emphasized. Timber stand management will focus on small diameter trees, thinning, strategic fuel breaks and prescribed fire to modify fire behavior. Develop a detailed timber management activity plan for the following 17 areas (primary management will be directed at ponderosa pine and lodgepole pine composition: • Esterbrook • Hartville Sunrise • Negro Hill • Banner Mountain • Coal Mountain • Bessemer Mountain • Salt Canyon • Deer Creek • Grave Springs • South Cottonwood-Notches Dome • Baldy Ridge • Rattlesnake Mountains • Badwater • Sioux Pass • Pine Mountain • Bates Creek-Sheep Creek • Squaw Mountain.	Management emphasis will be on restoring composition, structure and processes of forests and woodlands. Managing old growth for watershed stability, wildlife habitat, and recreation as primary resource considerations. Maximize opportunities to promote forest and woodland diversity, species vitality, and genetic diversity. Old growth stands will be identified and maintained or restored to pre-suppression conditions. Large tree retention will be emphasized. Inventory and classify all forest and woodlands as (1) commercial forestland and (2) noncommercial woodland.	Manage forest and woodlands not identified as old growth under HFRA to achieve a sustainable flow of wood products. Old growth stands will be identified and maintained or restored to pre-suppression conditions. Inventory and classify forest and woodlands defined in Alternative A as (1) commercial forestland and (2) noncommercial woodland	Manage commercial forest and woodlands not identified as old growth under HFRA to achieve maximum wood growth and flow of forest products. Old growth stands will be identified and maintained or restored to pre-suppression conditions. Inventory and classify all forest and woodlands as (1) commercial forestland and (2) noncommercial woodland.	Same as Alternative B, except manage forestlands to achieve a sustainable flow of wood products with forestlands being the primary resource, while also managing for multiple uses (i.e., watershed health and stability, wildlife, recreation, livestock grazing, etc.).
4025	BR:1.1 BR:1.2 BR:1.5	Same action as 4022.	Manage for desired forest composition, structure and processes to improve the health condition in commercial forestlands. Wildlife trees to include snags, and downed woody debris will be planned into and become an integral part of the stand. The natural forces of insect and disease infestations will be allowed to run their natural courses.	Manage for desired forest composition structure and processes condition in identified old growth. Other commercial forestlands where all age classes are represented, insects are endemic rather than epidemic, and sanitation cuts are used to remove trees infected with mistletoe and blister rust.	Manage commercial forest and woodlands not identified as old growth under HFRA to maximize production of forest products. Implement stand-treatment cycles for commercial ponderosa pine, lodgepole pine, and Douglas fir stands.	Same as Alternative C.
4026	BR:1.2	Same action as 4022.	Manage all ponderosa pine, mixed conifer and lodgepole pine stands for old growth pre-suppression conditions. Utilize prescribed fire and mechanical treatments in these stands to thin new growth, promote old growth, and maintain desired understory. Selected snags will be left for wildlife nesting, perches, and sources of food and cover. Products will be removed and sold for market value.	Manage ponderosa pine stands not identified as old growth under HFRA to achieve a sustainable flow of wood products. Utilize prescribed fire in these stands to thin new growth and maintain desired overstory and understory. Selected snags will be left for wildlife nesting, perches, and sources of food and cover. Products will be removed and sold for market value.	Manage all commercial stands not identified as old growth under HFRA to achieve a maximum flow of wood products. Utilize full range of silviculture practices to thin new growth and maintain desired age classes. Products will be removed and sold for market value.	Manage ponderosa, mixed conifer and lodgepole stands not identified as old growth under HFRA to a sustainable flow of small diameter wood products. Utilize prescribed fire in these stands to thin new growth and maintain desired overstory and understory. Selected snags will be left for wildlife nesting, perches, and sources of food and cover. Products will be removed and sold for market value. Manage ponderosa pine stands in Little Red Creek, Esterbrook, and Jackson Canyon for old growth, whether they meet HRFA old growth standards or not.

Table 2-3. Detailed Table of Alternatives (Continued)

4000 Biological Resources (BR) – Vegetation						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
4027	BR:1.2	Silvicultural practices will complement restoration of old growth timber . Lodgepole pine seedling stands will be thinned through Christmas tree sales. Commercial lodgepole pine stands will be thinned by sales of posts, poles, and firewood. Clear-cutting of 3 to 5 acres will provide for natural regeneration. If the stand is not regenerating naturally in 3 years, artificial regeneration will be undertaken.	Silvicultural treatments would emphasize restoration of pre-suppression stand composition structure and processes and be directed at fuels reduction , insect and disease control, revitalizing and regenerating desirable forest species, and maintaining or improving wildlife habitats. Silvicultural treatments would emphasize reduction of small diameter trees primarily through pre-commercial and commercial thinning and prescribed fire. Other approved silviculuture practices would include clear-cutting, shelterwood, seed-tree cutting, release cutting, mechanical mastication, salvage cuttings, chemical treatment, and planting/seeding when required. Clear-cuts are limited to 5 acres or less and mimic natural disturbance openings.	Silvicultural treatments would be used for insect and disease control and to promote a sustainable flow of small diameter wood products. In old growth stands and other stands where feasible, the silvicultural treatments would emphasize the restoration of pre-suppression composition, structure and processes. Silvicultural treatments include: pre-commercial and commercial thinnings, prescribed fire with clear-cutting, shelterwood, seed-tree cutting, release-cutting, improvement and salvage cuttings, chemical treatment, mechanical mastication and planting/seeding when required. Clear-cuts are limited to 20 acres or less and mimic natural disturbance openings.	Silvicultural treatments in stands not identified as old growth would be used to maximize wood growth in commercial forestlands. Silviculture treatments include thinnings, clear-cutting, shelterwood cutting, seed-tree cutting, release cutting, improvement and salvage cutting, prescribed fire, chemical, and planting/thinning when required.	Same as Alternative C.
4028	BR:1.2 BR:1.5	Full suppression of wildland fires within forestlands would continue.	Utilize wildland fire to achieve DFC for watershed stability and wildlife habitats. Suppress wildland fire where fire intensity poses high risk to forest stands or recreation infrastructure.	Utilize wildland fire in commercial forest stands to reduce fuel loads and (or) satisfy stand prescriptions.	Suppress all wildland fires in commercial forest stands.	Same as Alternative C, except wildland fire would be used in all forest stands to reduce fuel loads and (or) satisfy stand prescriptions. Utilize Appropriate Management Response to wildland fire, where possible, in commercial forest stands where a benefit would be a desired condition for watershed stability and wildlife habitat.
4029	BR:1.2	Negotiate and procure access that will facilitate the harvest of wood products from commercial forestlands. The stumpage value of the sale may be adjusted to offset access costs.	Utilize landowner agreements (cooperative agreements) for ingress/egress on product sales involving isolated commercial forestlands.	Concentrate forest management on commercial forestlands that have legal access. Ingresses/egresses would be addressed on a case-by-case basis.	Access (cooperative agreements and administrative) is the responsibility of the contractor and (or) partner for product sales in commercial forestlands.	Same as Alternative C.
4030	BR:1.2 BR:1.5	Harvest in Muddy Mountain EEA. Thinning will be done throughout the 1,260-acre Muddy Mountain EEA, as needed. About 200 MBF per year will be harvested annually for 5 years. The cut will be directed toward pine beetle control. After the 5-year period, the annual cut in the EEA will be about 25 MBF.	Manage forest stands within the 1,260-acre Muddy Mountain EEA in accordance with the Muddy Mountain EEA Forest Plan and emphasize forest stand management that benefits recreation use and wildlife habitats. Provide for casual harvest (firewood, posts and poles, hobby wood, etc.) up to 100 MBF annually where wildlife and recreation objectives are met. Treat aspen to achieve desired stand health. Interpret forest management practices that benefit recreation and education.	Manage forest stands within the 1,260-acre Muddy Mountain EEA in accordance with the Muddy Mountain EEA Forest Plan. Harvest at an annual rate of about 100 MBF where wildlife and recreation objectives are met. Treat aspen to achieve desired stand health. Interpret forest management practices to benefit recreation and education.	Manage forest stands within the 1,260-acre Muddy Mountain EEA in accordance with the Muddy Mountain EEA Forest Plan and accelerate harvest to an annual rate of about 200 MBF per year (all products) for 5 years. Thereafter, maintain an annual harvest at 100 MBF. Utilize casual harvest and commercial sales. Provide for mixed age stands, promote forest health by treating forest disease and insects as needed, protect recreation infrastructure by reducing ground and ladder fuels, and treat aspen to achieve desired stand health.	Same as Alternative C.
4031	BR:1.2	No similar action.	Slash, residues from hazard reduction, thinning, and tree damage from the elements will be scattered, piled and burned, chipped onsite, or broadcast burned.	Utilize biomass where markets are available. If unavailable, chip and scatter, pile and burn woody debris, or broadcast burn.	Utilize biomass generated from all forest sales and treatments.	Same as Alternative C.

Table 2-3. Detailed Table of Alternatives (Continued)

4000 Biological Resources (BR) – Vegetation						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
4032	BR:1.1 BR:1.14 BR:1.16 BR:4.1	Actions to achieve DFC in 2,822 acres of aspen communities are implemented on a case-by-case basis.	Manage 2,822 acres of aspen toward DPC per the criteria defined in Aspen Ecosystems Objectives for Sustaining Biodiversity. Utilize aspen communities to the greatest extent possible as natural fuel breaks in urban interface areas and wildlife habitats.	Manage 1,411 acres (50 percent of 2,822 acres) of aspen toward DPC per the criteria defined in Aspen Ecosystems Objectives for Sustaining Biodiversity. Utilize aspen communities to the greatest extent possible as natural fuel breaks in urban interface areas and wildlife habitats.	Manage 706 acres (25 percent of 2,822 acres) of aspen toward DPC per the criteria defined in Aspen Ecosystems Objectives for Sustaining Biodiversity. Utilize aspen communities to the greatest extent possible as natural fuel breaks in urban interface areas and wildlife habitats.	Same as Alternative B.
4033	BR:1.1 BR:1.2 BR:1.14 BR:1.15	Actions to achieve DFC in woodland communities are implemented on a case-by-case basis.	Retain or allow expansion of select areas of woodlands that provide thermal and hiding cover for elk and mule deer.	Create vegetation mosaics within woodlands that provide a preferred ratio of woodlands and adjacent habitats.	Limber pine and other woodland stands will be maintained or allowed to expand.	Same as Alternative C.
4034	BR:1.1 BR:1.2 BR:1.5	Actions to achieve DFC in woodland communities are implemented on a case-by-case basis.	Treat woodland encroachment in grassland, sagebrush, aspen, and other vegetative communities where it is determined to be detrimental to other resource values or uses.	Same as Alternative B.	Woodland encroachment in grassland, sagebrush, aspen, and other vegetative communities will not be treated.	Same as Alternative B.
4035	BR:1.2 BR:1.5	Actions to achieve DFC in woodland communities are implemented on a case-by-case basis.	Silvicultural treatments will be applied, as needed, to achieve objectives.	Silvicultural treatments will be applied, as needed, to achieve objectives.	Silvicultural treatments will not be applied.	Same as Alternative C.
Grassland and Shrubland Communities						
4036	BR:1.1 BR:1.14 BR:4.1	Actions to achieve DFC in sagebrush communities are implemented on a case-by-case basis. Existing sagebrush communities in the planning area are estimated at 630,183 acres.	Manage 630,183 acres of sagebrush communities toward DPC.	Manage 315,902 acres (50 percent of 630,183 acres) of sagebrush communities toward DPC.	Manage 157,546 acres (25 percent of 630,183 acres) acres of sagebrush communities toward DPC.	Same as Alternative B.
4037	BR:1.1 BR:1.14 BR:4.1	Actions to achieve DFC in 46,779 acres of mountain shrub communities are implemented on a case-by-case basis. Apply vegetative treatments where and when needed to achieve DFC, which may include, but not be limited to, improving age class diversity, plant vigor, and forage quality.	Manage 46,779 acres of mountain shrub communities toward DPC.	Manage 23,390 acres (50 percent of 46,779) of mountain shrub communities toward DPC.	Manage 11,695 acres (25 percent of 46,779) of mountain shrub communities toward DPC.	Same as Alternative B.
Riparian and Wetlands Communities						
4038	BR:1.1 BR:1.9 BR:1.11 BR:1.12 BR:2.2 BR:2.3 BR:4.1	Evaluate on a case-by-case basis the need for fencing of streams on BLM-administered lands.	Protect and (or) enhance riparian, wetland, and streamside areas, as necessary, with special management, including, but not limited to, fencing, development of alternative water supplies, livestock herding, placement of supplements (feed and mineral), pasture boundary adjustments, and season of use.	Same as Alternative B, except apply only to streams (regardless of class) that are non-functional or functional at risk on all BLM-administered lands.	Same as Alternative A.	Same as Alternative B.

Table 2-3. Detailed Table of Alternatives (Continued)

4000 Biological Resources (BR) – Vegetation						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
Invasive Nonnative Plant Species (INPS)						
4039	BR:1.1 BR:1.9 BR:1.11 BR:1.12 BR:2.2 BR:2.3 BR:4.1	No similar action.	Eradicate 1,700 acres of salt cedar.	Reduce salt cedar acreage by 1,275 acres.	Reduce salt cedar acreage by 850 acres.	Inventory and develop a treatment plan to reduce or eliminate salt cedar stands over the life of the plan.
4040	BR:1.6 BR:1.7 BR:1.8	INPS are controlled on a case-by-case basis with no comprehensive management program.	Develop a comprehensive INPS management program consistent with "Partners Against Weeds" and include the following: 1) Develop situational and site-specific mitigation measures 2) Designate Weed Management Areas • Level I Weed Management Area – Emphasis is on containment of heavily infested areas and stopping the spread of weeds to uninfested areas. This area currently includes 829,133 public acres, but will expand and contract based on inventory and treatment. • Level II Weed Management Area – Emphasis is on the eradication of small patches and isolated infestations, and stopping the spread of weeds to uninfested areas. This area currently includes 532,444 public acres but will expand and contract based on inventory and treatment.	Same as Alternative B.	A comprehensive INPS management program would not be developed.	Same as Alternative B, except the reference to acreage is removed under the Weed Management Areas.
4041	BR:1.1 BR:1.6 BR:1.7 BR:1.8 BR:1.9	No similar action.	**Livestock Movement from INPS Infested Areas** When the authorized officer determines that livestock are likely carrying ingested INPS seeds, the authorized officer may require that said livestock are flushed for a period of 72 hours before allowing the livestock to move onto or within public lands.	**Livestock Movement from INPS Infested Areas** When the authorized officer determines that livestock are likely carrying ingested INPS seeds in a Level I Weed Management Area, the authorized officer may require that said livestock are flushed for a period of 72 hours before allowing the livestock to move onto or within the public lands.	**Livestock Movement from INPS Infested Areas** Livestock flushing would not be required.	Same as Alternative C.

Table 2-3. Detailed Table of Alternatives (Continued)

4000 Biological Resources (BR) – Fish

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Management actions impacting fish are encompassed in other wildlife and biological resources management actions. No additional management actions were identified specifically for fish.						

4000 Biological Resources (BR) – Wildlife

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Big Game						
4042	BR:1.14 BR:4.1	No surface development is allowed from November 15 through April 30 (TLS) on all big game crucial winter ranges. The authorized officer may approve exceptions, waivers, or modifications of this limitation in writing, including documented supporting analysis. This does not apply to maintenance of existing facilities.	Restrict surface-disturbing and wildlife-disturbing activities from November 15 through April 30 (TLS) on all crucial big game winter ranges.	No surface disturbance and wildlife-disturbing activities are allowed from November 15 through April 30 (TLS) on all crucial big game winter ranges. For developments occurring in crucial big game winter ranges, a wildlife mitigation plan would be developed and include maintenance and operation activities. The authorized officer can grant exceptions for development activities. This restriction would not apply to the Salt Creek and Wind River SMAs.	No surface-disturbing and wildlife disturbing activities are allowed from November 15 through April 30 (TLS) on all crucial big game winter ranges. The authorized officer can grant exceptions. This restriction would not apply to the Salt Creek and Wind River SMAs.	Same as Alternative D.
Trophy Game						
4043	BR:4.1	Baiting of trophy game animals within the Muddy Mountain EEA is prohibited within ½ mile of any development.	Baiting of trophy game animals is prohibited within 1 mile of any BLM recreation development (i.e., developed campgrounds, interpretive sites, trailheads, trails, and picnic areas).	Baiting of trophy game animals is prohibited within ½ mile of any BLM recreation development (i.e., developed campgrounds, interpretive sites, trailheads, trails, and picnic areas).	Same as Alternative C.	Same as Alternative B.
Furbearing Animals						
Management actions impacting furbearing animals are encompassed in other wildlife and biological resources management actions. No additional management actions were identified specifically for furbearing animals.						
Predatory Animals						
Management actions impacting predatory animals are encompassed in other wildlife and biological resources management actions. No additional management actions were identified specifically for predatory animals.						
Small Game						
Management actions impacting small game are encompassed in other wildlife and biological resources management actions. No additional management actions were identified specifically for small game animals.						
Game Birds						
4044	BR:1.14 BR:4.1	Surface occupancy or use within ¼ mile of a sharp-tailed grouse strutting/dancing ground will be restricted or prohibited unless the operator/proponent and the authorized officer arrive at an acceptable plan for mitigation of anticipated impacts (CSU).	Prohibit surface disturbance or occupancy (NSO) within ½ mile of the perimeter of occupied sharp-tailed grouse leks. Avoid human activity between 8 p.m. and 8 a.m. from March 1 to May 15 (TLS) within ¼ mile of the perimeter of occupied sharp-tailed grouse leks.	Prohibit surface disturbance or occupancy (NSO) within ¼ mile of the perimeter of occupied sharp-tailed grouse leks. Avoid human activity between 8 p.m. and 8 a.m. from March 1 to May 15 (TLS) within ¼ mile of the perimeter of occupied sharp-tailed grouse leks.	Same as Alternative A.	Same as Alternative A.

Table 2-3. Detailed Table of Alternatives (Continued)

4000 Biological Resources (BR) – Wildlife						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
4045	BR:1.14 BR:4.1	No surface use is allowed within 1-¾ miles from the ¼ mile protection zone between March 1 and June 15 so that the nesting area around the sharp-tailed grouse strutting/dancing ground can be protected. The authorized officer may authorize exceptions to the time and distance limitations (TLS) in any particular year.	Prohibit surface-disturbing and disruptive activities in suitable sharp-tailed grouse nesting and early brood-rearing habitats within 4 miles of an occupied lek (NSO). Surface disturbing and disruptive activities in identified sharp-tailed grouse nesting and early brood-rearing habitat outside the 4-mile buffer would be prohibited from March 15 to July 15 (TLS).	Prohibit surface-disturbing and disruptive activities in suitable sharp-tailed grouse nesting and early brood-rearing habitat within 2 miles of an occupied lek (NSO). Surface disturbing and disruptive activities in identified sharp-tailed grouse nesting and early brood-rearing habitat outside the 2-mile buffer would be prohibited from March 15 to July 15 (TLS).	Same as Alternative A.	Same as Alternative A.
Migratory Game Birds (Waterfowl)						
Management actions impacting migratory game birds (waterfowl) are encompassed in other wildlife and biological resources management actions. No additional management actions were identified specifically for migratory game birds (waterfowl).						
Nongame (Raptors)						
4046	BR:1.15 BR:2.1 BR:4.1	To protect important raptor nesting habitat, activities or surface use will not be allowed from February 1 to July 31 within certain areas. The BLM authorized officer, who will consider topography and raptor prey habitats surrounding the nest site, will determine the size of the buffer zone on a case-by-case basis. Usually, the buffer zone will be ¼ to ½ mile. The general dates of restriction for all species are February 1 through July 31 (or until the young have fledged) (TLS).	Prohibit surface disturbance or occupancy within ½ mile buffer of raptor nests from February 1 to July 31, or until young birds have fledged (TLS).	Avoid surface disturbance or occupancy within ½ mile buffer of raptor nests from February 1 to July 31, or until young birds have fledged (TLS). The authorized officer, on a case-by-case basis, may grant exceptions to seasonal stipulations.	Avoid surface disturbance or occupancy within a ½-mile buffer of raptor nests, except for the species listed below, for which a ¼-mile buffer will be required: Red-tailed hawk Swainson's hawk American kestrel Osprey Great horned owl Long-eared owl Northern saw-whet owl Common barn owl Western screech owl The seasonal restriction would be February 1 to July 31, or until young birds have fledged (TLS). The authorized officer, on a case-by-case basis, may grant exceptions to seasonal stipulations.	Same as Alternative D.
Nongame (Neotropical Migrants)						
Management actions impacting nongame neotropical migrants are encompassed in other wildlife and biological resources management actions. No additional management actions were identified specifically for nongame neotropical migrants.						
Nongame (Mammals)						
Management actions impacting nongame mammals are encompassed in other wildlife and biological resources management actions. No additional management actions were identified specifically for nongame mammals.						
Nongame (Reptiles/Amphibians)						
Management actions impacting nongame reptiles/amphibians are encompassed in other wildlife and biological resources management actions. No additional management actions were identified specifically for nongame reptiles/amphibians.						

Table 2-3. Detailed Table of Alternatives (Continued)

4000 Biological Resources (BR) – Special Status Species						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
Special Status Species - Plants						
4047	BR:1.17 BR:2.1	Special status plant habitats are considered on a case-by-case basis when designing placement of water development projects.	Design placement of water developments and placement of salt and mineral supplements for livestock at least ¼ mile away from known locations of special status plants. Consider the concentration of browsing/grazing animals on known locations of special status plants.	Design placement of water developments and placement of salt and mineral supplements for livestock at least 500 feet away from known locations of special status plants. Consider the concentration of browsing/grazing animals on the known locations of special status plants.	Design placement of water developments and placement of salt and mineral supplements for livestock at least 300 feet away from known locations of special status plants. Consider the concentration of browsing/grazing animals on the known locations of special status plants.	Same as Alternative C, except on a case-by-case basis exceptions could be granted when site-specific analysis determines that there would be no adverse impacts to special status plants.
Special Status Species - Fish						
4048	BR:1.1 BR:1.14	No similar action.	Manage public access on all occupied special status species fish habitats.	Same as Alternative B.	Manage public access for federally listed species designated critical habitat areas.	Same as Alternative D.
Special Status Species – Upland Game Birds (greater sage-grouse)						
Bates Hole and Fish Creek/Willow Creek						
4049	BR:1.15 BR:2.1 BR:4.1	Avoid surface disturbance or occupancy within ¼ mile of the perimeter of occupied sage-grouse leks. Avoid human activity between 8 p.m. and 8 a.m. from March 1 to May 15 (TLS) within ¼ mile of the perimeter of occupied sage-grouse leks.	Occupied sage-grouse leks would have a ¾-mile NSO buffer to protect breeding habitats. Human activity would be avoided between 8 p.m. and 8 a.m. from March 1 to May 15 (TLS) within this buffer. Leks, which are currently displayed as points, would be displayed as polygons.	Same as Alternative B, except occupied sage-grouse leks would have a ½-mile NSO buffer to protect breeding habitats.	Same as Alternative A.	Occupied sage-grouse leks would have a ¾-mile CSU buffer to protect breeding habitats. Human activity would be avoided between 8 p.m. and 8 a.m. from March 1 to May 15 (TLS) within this buffer. Leks, which are currently displayed as points, would be displayed as polygons.
4050	BR:1.15 BR:2.1 BR:4.1	Avoid surface-disturbing and disruptive activities in suitable sage-grouse nesting and early brood-rearing habitats within 2 miles of an occupied lek, or in identified sage-grouse nesting and early brood-rearing habitats outside the 2-mile buffer from March 15 to July 15 (TLS).	Sage-grouse nesting and early brood-rearing habitats surrounding occupied sage-grouse leks will be delineated through a 4-mile buffer. Within this 4-mile buffer, suitable nesting brood-rearing habitats would be protected through an NSO stipulation. Surface-disturbing and disruptive activities in identified sage-grouse nesting and early brood-rearing habitats outside the 4-mile buffer would be restricted from March 15 to July 15 (TLS).	Same as Alternative B, except occupied sage-grouse leks would have a 2-mile buffer where NSO would be allowed in suitable nesting and early brood-rearing habitats. Occupied sage-grouse leks would have an additional 1-mile buffer extending beyond the 2-mile buffer, where surface-disturbing or disruptive activities would be restricted from March 15 to July 15 (TLS).	Same as Alternative A.	Occupied sage-grouse leks would have a 4-mile buffer. Within this buffer, surface development or wildlife-disturbing activities would be restricted March 15 through July 15 (TLS). Also, within this 4-mile buffer, surface disturbance would avoid (year-round) sagebrush stands (of greater than 10 percent canopy cover). Within this 4-mile buffer, mitigate for power poles and other high profile structures that may provide raptor perches. Avoid placement of these structures if possible, or install devices to preclude raptor perching on the structures.
4051	BR:1.15 BR:2.1 BR:4.1	Avoid surface-disturbing and disruptive activities in sage-grouse winter habitats from November 15 to March 14 (TLS).	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.	As sage-grouse winter habitats are designated, a TLS would restrict activities from November 15 to March 14 (TLS). Apply a CSU restriction within these areas to avoid disturbing sage-grouse during winter and to avoid disturbing sagebrush stands (of greater than 20 percent canopy cover), where possible.

Table 2-3. Detailed Table of Alternatives (Continued)

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
4000 Biological Resources (BR) – Special Status Species						
4052	BR:1.15 BR:2.1 BR:4.1	Vegetative treatments would occur on a case-by-case basis.	The areas would have priority for vegetative treatments to improve sage-grouse habitats and for vegetation monitoring to ensure residual herbaceous vegetation is maintained for nesting cover on public lands. Vegetative treatments to meet sage-grouse habitat objectives would be allowed inside the buffers.	Same as Alternative B	Same as Alternative A.	The areas would have priority for vegetative treatments to improve sage-grouse habitats and for vegetation monitoring to ensure residual herbaceous vegetation is maintained for nesting cover on public lands.
Areas Outside of Bates Hole and Fish Creek/Willow Creek						
4053	BR:1.15 BR:2.1 BR:4.1	Avoid surface disturbance or occupancy within ¼ mile of the perimeter of occupied sage-grouse leks. Avoid human activity between 8 p.m. and 8 a.m. from March 1 to May 15 (TLS) within ¼ mile of the perimeter of occupied sage-grouse leks.	Same as Alternative A, except prohibit surface disturbance or occupancy within ½ mile of the perimeter of occupied sage-grouse leks.	Same as Alternative A, except prohibit surface disturbance or occupancy within ¼ mile of the perimeter of occupied sage-grouse leks.	Same as Alternative A.	Same as Alternative A.
4054	BR:1.15 BR:2.1 BR:4.1	Avoid surface-disturbing and disruptive activities in suitable sage-grouse nesting and early brood-rearing habitats within 2 miles of an occupied lek, or in identified sage-grouse nesting and early brood-rearing habitats outside the 2-mile buffer from March 15 to July 15 (TLS).	Prohibit surface-disturbing and disruptive activities in suitable sage-grouse nesting and early brood-rearing habitats within 4 miles of an occupied lek (NSO). Surface-disturbing and disruptive activities in identified sage-grouse nesting and early brood-rearing habitats outside the 4-mile buffer would be prohibited from March 15 to July 15 (TLS).	Prohibit surface-disturbing and disruptive activities in suitable sage-grouse nesting and early brood-rearing habitats within 2 miles of an occupied lek (NSO). Surface-disturbing and disruptive activities in identified sage-grouse nesting and early brood-rearing habitats outside the 2-mile buffer would be prohibited from March 15 to July 15 (TLS).	Same as Alternative A.	Same as Alternative A.
4055	BR:1.15 BR:2.1 BR:4.1	Avoid surface-disturbing and disruptive activities in sage-grouse winter habitats from November 15 to March 14 (TLS).	Prohibit surface-disturbing and disruptive activities in sage-grouse winter habitats from November 15 to March 14 (TLS).	Same as Alternative B.	Same as Alternative A.	Same as Alternative A.
Special Status Species – Migratory Game Birds (Waterfowl)						
Management actions impacting special status species migratory game birds (waterfowl) are encompassed in other wildlife and biological resources management actions. No additional management actions were identified specifically for special status species migratory game birds (waterfowl).						
Special Status Species – Nongame (Raptors)						
4056	BR:2.1 BR:3.1 BR:4.1	No similar action.	To provide for long-term protection of ANS sites, a combination of NSO and TLS buffer zones would be applied around the nesting structures. The TLS restriction would be from February 1st through July 31st, or until the young fledge. For ferruginous hawk ANS, apply a ½-mile NSO buffer with an additional ½-mile seasonal buffer (total of a 1-mile buffer). For golden eagle ANS, apply a ½-NSO buffer without an additional seasonal buffer (total ½-mile buffer). This restriction is intended to preclude the placement of permanent facilities within the NSO buffers. Development and placement of ANS targeting ferruginous hawk should be managed intensively to maintain a majority of the population utilizing natural nesting substraights.	Similar to Alternative B, except as follows: For ferruginous hawk ANSs, apply a ½-mile NSO with an additional ¼- mile seasonal buffer (TLS) (i.e., a total of a ¾ -mile buffer). For golden eagle ANSs, apply a ½-mile NSO buffer without an additional seasonal buffer (i.e., a total ½-mile buffer). Development and placement of an ANS targeting ferruginous hawk should be managed intensively to maintain a majority of the population utilizing natural nesting substraights.	Similar to Alternative B, except as follows: For ferruginous hawk ANSs, apply a ¼-mile NSO buffer with an additional ½- mile seasonal buffer (TLS) (i.e., a total of a ¾ -mile buffer). For golden eagle ANSs, apply a ¼-mile NSO buffer with an additional ¼-mile seasonal (TLS) buffer (i.e., a total ½-mile buffer). Development and placement of an ANS targeting ferruginous hawk should be managed intensively to maintain a majority of the population utilizing natural nesting substraights.	Same as Alternative B, except strive to maintain overall ANS usage that does not exceed 25 percent of the total nesting population for ferruginous hawks.

Table 2-3. Detailed Table of Alternatives (Continued)

4000 Biological Resources (BR) – Special Status Species						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
4057	BR:2.1 BR:4.1	To protect special status raptor nesting habitats, activities or surface use will not be allowed from February 1st through July 31st within certain areas (TLS). The BLM authorized officer, who will consider topography and special status raptor prey (excluding bald eagles) habitats surrounding the nest site will determine the size of a buffer zone on a case-by-case basis. Usually the buffer zone will be ¼ to ½ mile.	Prohibit surface disturbance or occupancy within 1-mile buffer of special status raptor nests (excluding bald eagles) from February 1 to July 31, or until young birds have fledged (TLS).	Same as Alternative B. The authorized officer, on a case-by-case basis, may grant exceptions to seasonal restrictions.	Avoid surface disturbance or occupancy (CSU) within ½-mile buffer of special status raptor nests (excluding bald eagles). The seasonal restriction would be February 1 to July 31, or until young birds have fledged (TLS). The authorized officer, on a case-by-case basis, may grant exceptions to seasonal restrictions.	Same as Alternative A.
Special Status Species – Nongame (Neotropical Migrants)						
Management actions impacting special status neotropical migrants are encompassed in other special status species, wildlife, and biological resources management actions. No additional management actions were identified specifically for special status neotropical migrants.						
Special Status Species – Nongame (Mammals)						
4058	BR:1.1 BR:1.18 BR:4.1	No similar action.	Manage an estimated 145,641 acres of public land for potential black-footed ferret reintroduction.	Same as Alternative B.	Habitats managed for reintroductions of black-footed ferrets would be addressed on a case-by-case basis.	Same as Alternative D.
4059	BR:2.1 BR:3.2 BR:4.1	Prairie dog control within the planning area may be initiated where the following criteria are met: Treatment of prairie dog towns will be considered only if a written request is received from the owner of adjacent property or the grazing lessee. No prairie dog control measures will be allowed on public land in areas of historical black-footed ferret occurrences, a confirmed sign has been recorded within the last 5 years, or if the USFWS determines the town is an essential habitat for the survival of the ferret. No prairie dog control measures will be carried out on prairie dog towns that are more than ½ mile from private lands. Treatment of private land must be done concurrently with treatment of public land.	No prairie dog control will be conducted, except when public health and safety risks warrant control.	Prairie dog control within the planning area may be initiated as follows: The APHIS or their authorized agent carry out prairie dog control actions. No prairie dog control measures will be carried out on prairie dog towns that are more than ½ mile from private land, unless a human health or safety concern is documented, or where resource damage occurs and is documented by the BLM. Treatment of prairie dog towns will be considered only if a written request is received from the owner of adjacent property. The BLM will not conduct treatment unless adjacent private lands are treated concurrently. No treatment would occur in areas identified for black-footed ferret reintroduction, except when public health and safety risks warrant control.	Same as Alternative A.	Same as Alternative C, except surface-disturbing and disruptive activities should be designed in a manner that avoids prairie dog towns and complexes. Where this is impractical, the disturbance should be located in a manner where it will have the least amount of impact to prairie dogs.
Special Status Species – Nongame (Amphibians)						
Management actions impacting special status amphibians are encompassed in other special status species, wildlife, and biological resources management actions. No additional management actions were identified specifically for special status amphibians.						

Table 2-3. Detailed Table of Alternatives (Continued)

5000 Heritage and Visual Resources (HR) – Goals and Objectives

GOAL HR:1 Preserve and protect cultural and paleontological resources and ensure that they are available for appropriate use by present and future generations.

OBJECTIVES –

HR:1.1 Develop project or site-specific treatment plans or other protective measures for special areas or cultural resources in areas of high risk for development or at high risk for adverse impacts.

HR:1.2 Consult with Native American tribal governments at the leasing stage for proposed land uses having the potential to impact cultural resources identified as having tribal interests or concerns.

HR:1.3 Develop activity plans for special areas or cultural resources identified as high risk for adverse impacts (e.g., Cedar Ridge).

GOAL HR:2 Reduce imminent threats to cultural and paleontological resources from natural or human-caused deterioration, or potential conflict with other resource uses.

OBJECTIVES –

HR:2.1 Establish cultural resource inventory priority areas in the RMP implementation strategy document.

GOAL HR:3 Promote stewardship, conservation, and appreciation of cultural and paleontological resources.

OBJECTIVES –

HR:3.1 Maintain and enhance programs that provide opportunities for scientific research of cultural and paleontological resources.

HR:3.2 Improve educational opportunities and public outreach programs.

HR:3.3 Develop and maintain interpretation of cultural and paleontological resources in areas of high public interest and access.

GOAL HR:4 Establish a working relationship with Native American tribes.

OBJECTIVES –

HR:4.1 Maintain proactive consultation with Native Americans, as appropriate, to identify resource types or places that may be impacted by BLM authorizations or actions.

HR:4.2 Maximize opportunities for cooperation with tribal governments for managing cultural resources and public education.

GOAL HR:5 Manage public lands in a manner that will maintain the overall scenic (visual) quality of these lands.

OBJECTIVE -

HR:5.1 Class II: Retain the existing character of the landscape. The level of change should be low. Management activities should be seen, but not attract attention of the casual observer. The basic elements of form, line color, and texture found in the predominant natural features of the characteristic landscape should be repeated.

HR:5.2 Class III: Partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

HR:5.3 Class IV: Provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the focus of the viewer's attention; however, every attempt should be made to minimize the impacts of these activities through careful location, minimizing disturbance, and repeating elements.

5000 Heritage and Visual Resources (HR) – Management Actions Common to All Alternatives

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
5001	HR:1.1	Protect cultural sites within the 1,633-acre Notches Dome Archeological District (48NA368) that have been or may be nominated to the National Register so that surface development will not affect those sites (NSO). Surface development proposals within the Notches Dome Archeological District will require an onsite Class III inventory before implementation. This requirement will be voided if the BLM completes a Class III inventory for all land within the archeological district. There is one KGS within the archeological district. Production and development of oil and gas will be the priority within the KGS unless a cultural site is of National Register quality. In that case, the cultural site will be protected. Proposals in the rest of the archeological district will be evaluated on a case-by-case basis.				
5002	HR:4.1	Inventory potentially sensitive cultural places identified during Native American consultation independent of specific land-use actions. Apply tools (such as site avoidance, buffer area) to protect sensitive cultural sites, as necessary.				
5003	HR:1.1	NSO on the 534-acre Spanish Diggings prehistoric quarry (48PL48).				
5004	HR:3.2	Develop public outreach and education efforts within the planning area to instill a conservation ethic within the public regarding paleontological resources.				
5005	HR:5.1 HR:5.2 HR:5.3	Facilitate VRM mitigation in areas that do not meet class objectives as the need or opportunity arises.				
5006	HR:5.1 HR:5.2 HR:5.3	Review, periodically, the visual resources for the planning area.				

Table 2-3. Detailed Table of Alternatives (Continued)

5000 Heritage Resources (HR) – Cultural

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
5007	HR:1.1	Cultural resource inventories and site evaluations within the planning area are in direct response to specific land-use proposals in accordance with Section 106 of the NHPA. Additional inventory is carried out, when resources permit, to comply with Section 110 of the NHPA.	Conduct Class III block surveys on leases, oil and gas units, oil and gas fields, and similar large-scale development areas; otherwise, cultural resource inventories will continue to be done on an individual project basis.	Conduct Class III inventories on APE and buffer zone (minimum 300 feet) around development on a project-by-project basis.	Conduct Class III inventories on APE and buffer zone (minimum 100 feet) around development on a project-by-project basis.	Same as Alternative A, except block inventories would be applied when full field development is identified. Case-by-case inventories would be conducted, as needed, on other projects to comply with NHPA.
5008	HR:1.3	**C-5: Protection of Cultural Sites** Sites in this category were identified in decision C-5 of the 1985 RMP (Map 31). Surface development will not be permitted (NSO) on the following sites; they will be assessed for stabilization and management needs (120 acres): 48NA227, 48NA940, 48NA84, and Rock Cairn Trail (South Bighorn Mountains).	NSO onsite and within 300 feet of the following sites: 48NA227, 48NA940, and 48NA84. The restriction on the Rock Cairn Trail in the South Bighorn Mountains is not carried forward (Map 31). Additional sites may be found, which will also be NSO.	NSO onsite and CSU within 300 feet of the following sites: 48NA227, 48NA940, and 48NA84. The restriction on the Rock Cairn Trail in the South Bighorn Mountains is not carried forward (Map 31). Additional sites may be found, which will also be NSO.	NSO on the following sites: 48NA227, 48NA940, and 48NA84. The restriction on the Rock Cairn Trail in the South Bighorn Mountains is not carried forward (Map 31). Additional sites may be found, which will also be NSO.	Same as Alternative C (Map 31).
5009	HR:1.1	No similar action for Pine Ridge.	The minimum cultural resource block inventory size shall be 40 acres in Pine Ridge. Linear inventories shall cover a minimum of 100 feet on either side of centerline.	Same as Alternative B.	Same as Alternative A.	Same as Alternative B, except linear inventories would cover a minimum of 100 feet on either side of surface disturbance.

5000 Heritage and Visual Resources (HR) – Paleontological (see Special Designations: Alcova Fossil Area for additional information on paleontology)

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
5010	HR:3.3	No similar action.	Do not develop interpretive facilities.	Identify broad areas containing important paleontological resources and develop interpretive facilities (e.g., signs, kiosks, and interpretive centers) on a case-by-case basis in regional overviews without identifying specific localities.	Develop interpretive facilities (e.g., signs, kiosks, and developed areas) at specific localities with high paleontological values on a case-by-case basis.	Same as Alternative D.
5011	HR:3.1 HR:3.2	Collection of fossils from public lands is allowed with some restrictions, depending on the significance of the fossils. Hobby collection of common invertebrate or plant fossils by the public is allowed in reasonable quantities using hand tools.	Same as Alternative A.	Same as Alternative A.	Identify and designate hobby collection areas (i.e., areas pre-identified for containing concentrations of common invertebrate and plant fossils and where public fossil collection activities pose no significant threats to paleontological or other resources) for collection of common invertebrate or plant fossils by the public. Manage these areas by restricting all surface, use as necessary, and restricting fossil collection, as necessary.	Same as Alternative D.

Table 2-3. Detailed Table of Alternatives (Continued)

5000 Heritage and Visual Resources (HR) – Paleontological (see Special Designations: Alcova Fossil Area for additional information on paleontology)						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
5012	HR:3.1	Two types of permits are issued. The basic permit is the survey and limited surface collection permit, issued for reconnaissance work and collection of surface finds, with a 1 square meter limit on surface disturbance. If the work will exceed 1 square meter, or requires mechanized equipment, the researcher must apply for an excavation permit. Prior to authorization of an excavation permit, and in some cases for survey permits in SMAs, the BLM must prepare an EA of the proposed location.	Apply standard stipulations to all paleontological resource use permits only. Include additional stipulations only if necessary on a case-by-case basis.	Add additional stipulations to paleontological resource use permits to protect other resource values on a case-by-case basis.	Add additional stipulations to all paleontological resource use permits to protect other resource values (e.g., require erosion control and reseeding).	Same as Alternative C.
5013	HR:3.1	Issue permits on demand for paleontological research by qualified paleontologists (current management).	Actively solicit research efforts throughout the planning area to identify, monitor, and gather research data on paleontological resources.	Develop cooperative agreements and partnerships to encourage research.	Same as Alternative A.	Same as Alternative C.
5014	HR:1.1 HR:2.1	No similar action.	Proactively identify and designate areas of high paleontological values for management as SMAs. As needed, implement NSO, No Surface Disturbance, and minerals withdrawal, as well as acquire neighboring nonfederal parcels, as appropriate, and take other management actions or limit other uses.	Identify areas that contain high paleontological values. Protect those areas from undue degradation by limiting surface-disturbing activities in number and scope as allowable. Designate lands for retention.	Apply standard paleontological mitigation guidelines to all surface-disturbing activities.	Same as Alternative C.
5015	HR:1.1 HR:1.3	Acquire lands that have high resource values.	Retain public lands with significant paleontological values. Identify and acquire non-BLM parcels within the planning area that contain significant paleontological values.	Retain public lands with significant paleontological values. Identify non-BLM parcels that contain significant paleontological values. Include in acquisition efforts prompted by other resources, as applicable.	Retain public lands with significant paleontological values.	Same as Alternative C, except acquisition efforts would be pursued through exchange, purchase, or donation.
5016	HR:1.1 HR:1.3	No similar action.	Identify areas with high paleontological values that are at risk for damage from illegal activities. Increase BLM law enforcement presence in these areas. Post additional signs indicating collection is illegal.	Identify areas with high paleontological values that are at risk for damage from illegal activities. Increase BLM law enforcement presence in these areas.	Identify areas with high paleontological values that are at risk for damage from illegal activities. Monitor yearly.	Same as Alternative C.
5017	HR:2.1	Assess adverse impacts to paleontological resources and apply appropriate mitigation for all surface-disturbing activities.	Require an on-the-ground survey prior to approval of surface-disturbing activities or land-disposal actions and monitor surface-disturbing activities for Class 3, 4, and 5 formations (see Probable Fossil Yield Classification in the glossary).	Require an on-the-ground survey prior to approval of surface-disturbing activities or land-disposal actions and monitor surface-disturbing activities for Class 4 and 5 formations (see Probable Fossil Yield Classification in the glossary).	Require an on-the-ground survey prior to approval of surface-disturbing activities or land-disposal actions for Class 4 and 5 formations (see Probable Fossil Yield Classification in the glossary).	Require an on-the-ground survey prior to approval of surface-disturbing activities or land-disposal actions for Class 4 and 5 formations. Monitor during surface-disturbing activities only as appropriate. Apply, as deemed necessary, for Class 3 formations (see Probable Fossil Yield Classification in the glossary).

Table 2-3. Detailed Table of Alternatives (Continued)

5000 Heritage and Visual Resources (HR) – Visual						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
5018	HR:5.1 HR:5.2 HR:5.3	Visual resource values would continue to be managed under the five VRM classes designated in the 1981 Platte River Resource Area Oil and Gas Programmatic EA, Map 32. Detailed VRM class objectives are located in the glossary under the heading "Visual Resource Management Classes." Manage 109,827 acres of BLM-managed surface and 365,967 acres of federal mineral estate as VRM Class II. Manage 210,258 acres of BLM-managed surface and 909,283 acres of federal mineral estate as VRM Class III. Manage 953,543 acres of BLM-managed surface and 3,200,074 acres of federal mineral estate as VRM Class IV. Class V: Manage 2,074 acres of BLM-managed surface and 6,881 acres of federal mineral estate as VRM Class V. Note: There are no Class I areas designated in the planning area. Class IV and Class V areas under current management correspond to Class IV in alternatives B through E.	Visual resource values would be managed under the VRM classes as defined in the 2004 Casper Field Office VRM Inventory (Map 33). The foreground/midde ground of NHTs will be managed as Class II until inventories are completed. Trail segments contributing to the overall eligibility that have integrity of setting will be managed as VRM Class II. Where integrity of setting is lacking, the foreground/middle ground of NHTs will be managed as Class III. Manage 408,576 acres of BLM-managed surface and 1,062,550 acres of federal mineral estate as VRM Class II. Manage 415,458 acres of BLM-managed surface and 1,022,622 acres of federal mineral estate as VRM Class III. Manage 537,543 acres of BLM-managed surface and 2,572,000 acres of federal mineral estate as VRM Class IV.	Visual resource values would be managed under the VRM classes defined by Map 34. Changes in the number of acres within each VRM class depict a balance between development activities and protection of visual resources. The foreground/midde ground of NHTs will be managed as Class II until inventories are completed. Trail segments contributing to the overall eligibility that have integrity of setting will be managed asVRM Class II. Where integrity of setting is lacking, the foreground/middle ground of NHTs, will be managed as Class III. Manage 367,151 acres of BLM-managed surface and 816,310 acres of federal mineral estate as VRM Class II. Manage 433,799 acres of BLM-managed surface and 1,211,145 acres of federal mineral estate as VRM Class III. Manage 560,627 acres of BLM-managed surface and 2,629,717 acres of federal mineral estate as VRM Class IV.	Visual resource values would be managed under the VRM classes defined by Map 35. Changes in the number of acres under each VRM class were adjusted to be less restrictive to mineral and renewable energy development. The foreground/midde ground of NHTs will be inventoried. Trail segments contributing to the overall eligibility that have integrity of setting will be managed as the VRM class in which they are located, using BMPs to mitigate proposed visual intrusions. The class objectives will be as defined by the 2004 Casper Field Office VRM Inventory. Manage 205,542 acres of BLM-managed surface and 465,688 acres of federal mineral estate as VRM Class II. Manage 548,780 acres of BLM-managed surface and 1,518,434 acres of federal mineral estate as VRM Class III. Manage 607,255 acres of BLM-managed surface and 2,673,050 acres of federal mineral estate as VRM Class IV.	Same as Alternative C (Map 36).

Table 2-3. Detailed Table of Alternatives (Continued)

6000 Land Resources (LR) – Goals and Objectives

GOAL LR:1 Manage the acquisition, disposal, withdrawal, and use of public lands to meet the needs of internal and external customers and to preserve important resource values.

OBJECTIVES -

LR:1.1 Develop and maintain a land-ownership pattern that will provide better access for managing and protecting public lands.

LR:1.2 Maximize appropriate disposal actions to help solve problems related to intermixed land-ownership patterns.

LR:1.3 Maintain availability of public lands to meet the habitation, cultivation, trade, mineral development, recreation, and manufacturing needs of external customers and the general public.

LR:1.4 Identify lands for withdrawal to meet federal land-use needs.

GOAL LR:2 Manage suitable public lands for developing renewable energy (e.g., wind and solar).

GOAL LR:3 Manage public lands to meet transportation and ROW needs.

OBJECTIVES -

LR:3.1 Make public lands available to meet the needs of major ROW customers (e.g., an intrastate pipeline).

LR:3.2 Make public lands available to meet the needs for smaller ROW (e.g., roads or pipelines for oil fields).

LR:3.3 Maintain and acquire public access to meet resource management needs.

LR:3.4 Maintain a transportation management system to meet resource management needs.

GOAL LR:4 Manage the use of OHVs in partnership with other land-managing agencies, local governments, communities, and interest groups through a balanced approach, so as to protect public lands and resources while providing opportunities for the safe use and enjoyment of OHVs.

OBJECTIVES -

LR:4.1 Conduct an assessment of current and future OHV demand and plan for and balance the demand for OHV use with other multiple uses (or users) when developing the planning area transportation plan.

LR:4.2 Locate and manage OHV use to conserve soil functionality, vegetative cover, and watershed health. Manage OHV use to minimize the impact to the land while maintaining OHV access.

LR:4.3 Engineer, locate, and relocate roads and trails to accommodate OHV activities while minimizing resource impacts.

LR:4.4 Integrate concepts of habitat connectivity into OHV planning to minimize habitat fragmentation.

LR:4.5 Manage OHV use by type, season, intensity, distribution, and (or) duration to minimize the impact on plant and wildlife habitats. If seasonal closures become appropriate to minimize adverse OHV impact(s) on public lands resources, strive to preserve public access by designating alternative routes.

LR:4.6 Clearly identify route and area designations.

LR:4.7 Maintain an inventory of existing road and trail systems.

GOAL LR:5 Protect public land resources, promote safety for all public land users, and minimize conflicts among OHV users and various other uses of public lands.

OBJECTIVES -

LR:5.1 Utilize high-use areas and special events to maximize the dissemination of responsible-use education materials and concepts to the public.

LR:5.2 Cooperatively develop and improve public outreach programs to promote trail etiquette, environmental ethics, and a responsible-use stewardship ethic (e.g., tread lightly, leave no trace, etc.).

GOAL LR:6 Improve and (or) maintain rangeland health while providing opportunities for livestock grazing to support and sustain local communities.

OBJECTIVES -

LR:6.1 Whenever possible, maintain the opportunity to avoid net loss of AUMs within the planning area, and identify and implement opportunities for vegetation improvements to increase the number of AUMs available for livestock grazing to support and sustain local communities.

LR:6.2 Maximize the most appropriate use of SDWs and other SDW withdrawals.

LR:6.3 Maintain existing desirable rangeland conditions or improve rangeland health utilizing best grazing management practices.

GOAL LR:7 Manage recreation resources on public lands to provide a diverse array of benefits to the public, including economic, environmental, personal, and social benefits.

OBJECTIVES -

LR:7.1 Strive to achieve the objectives as outlined in the matrices for identified SRMAs (see Appendix O).

LR:7.2 Support and collaborate with local governments and service providers in adjoining communities to provide recreational opportunities for visitors and local residents to achieve health and fitness goals and quality-of-life benefits from public lands.

GOAL LR:8 Develop and maintain appropriate recreational facilities, balancing public demand, protection of public land resources, and fiscal responsibility.

OBJECTIVE -

LR:8.1 Manage and maintain recreation sites and facilities to acceptable operational standards.

GOAL LR:9 Issue Special Recreation Permits in an equitable manner for specific recreational uses of public lands and related waters as a means to minimize user conflicts, control visitor use, protect recreation resources, and provide for private and commercial recreation use.

OBJECTIVE -

LR:9.1 Complete processing requirements for requested Special Recreation permits.

GOAL LR:10 Develop and maintain cooperative relationships with national, state, and local recreation providers, tourism entities, and local recreational groups.

OBJECTIVES –

LR:10.1 Emphasize and support collaborative public outreach, awareness events, and programs that promote public service and stewardship.

LR:10.2 Encourage sustainable travel and tourism development with gateway communities and provide community-based conservation support for visitor services.

Table 2-3. Detailed Table of Alternatives (Continued)

6000 Land Resources (LR) – Management Actions Common to All Alternatives						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
6001	LR:1.1 LR:1.2	All public lands in Converse, Platte, and Goshen counties have been classified for disposal, disposal with restrictions, or for retention. In Natrona County, only those lands specifically identified as potentially suitable for disposal by sale, exchange, or other means have been classified. The remaining public lands in Natrona County are identified for retention. Lands identified for disposal under Sections 203, 206, and 209 of FLPMA and identified as such in this plan are hereby classified for disposal under Section 7 of the Taylor Grazing Act of 1934, as amended (43 U.S.C. 315f).				
6002	LR:1.1 LR:1.2	Means for land disposal include sale, exchange, lease, or conveyance under the R&PP Act, desert land entries, Indian allotments, color of title actions, Carey Act patents, state grants, and airport leases and conveyances.				
6003	LR:1.1 LR:1.2	Parcels identified for restricted disposal may be disposed of under the R&PP Act by exchange, may limit the disposal to a particular type of entity capable of preserving the resource values, or may include the use of covenants in the deed or land sale patent to ensure the resource values are protected.				
6004	LR:1.1 LR:1.2	Retention lands are intended to remain in public ownership. Public land tracts that are not critical to current management objectives will be disposed of to acquire land in high value areas as exchange opportunities arise. However, retention lands may be disposed of under the R&PP Act or through land exchange to meet public needs or to enhance management of the public lands and resources in these areas. Land sales within retention areas would be considered on a case-by-case basis to meet community expansion or other public needs, or to resolve resource management concerns. Criteria to consider when disposing of retention land by sale include, but are not limited to, lands with trespass where disposal is the best tool to meet management objectives while serving the public interest best. Standard trespass resolution practices will be adhered to, including collection of the BLM's actual cost to resolve the trespass.				
6005	LR:1.1 LR:1.2	Exchanges are developed on a case-by-case basis. As such, no quantification of disposal and acquisition acreages can be made before the specific exchange proposal is developed.				
6006	LR1	Acquisition of lands and interests in lands will be pursued in areas of high recreational or paleontological value, with sensitive cultural resources, areas with important fish and wildlife habitat, and along historic trail segments.				
6007	LR:1.4	Lands revoked from other agency withdrawals will be returned to BLM jurisdiction and will be managed in the same manner as the adjoining public lands.				
6008	LR:1.1	Lands that are reconveyed or acquired would be managed in the same manner as the adjoining public lands.				
6009	LR:2	Any future wind-energy development proposals would be subject to the *Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States*, ROD (December 2005).				
6010	LR:2	Wind and solar energy development on public land is authorized by ROW.				
6011	LR:3.3	Easements will be acquired only from a willing landowner.				
6012	LR:3.3 LR:3.4	Access will be acquired by easements, reciprocal ROW, exchange, purchase, and donation. Cooperative agreements can be used in some instances to provide access to public lands. Where practical, new road construction on federal land will be utilized to avoid the cost of acquisition.				
6013	LR:3.3 LR:3.4	Routing and construction standards will be adjusted based on route analysis and engineering design. Construction of new roads on federal land will be utilized, where practical, to reduce acquisition costs. Once an easement is acquired or a road is constructed on federal land, a ROW grant under Section 507 of the FLPMA will be executed to record the road and commit it to the road maintenance program.				
6014	LR:3.3 LR:3.4	Roads constructed under other initiatives (e.g., oil and gas exploration) will be evaluated for inclusion in the BLM transportation system. Those roads that meet BLM resource program needs will be considered for cooperative development. When such roads are no longer needed for the original purposes, and prior to termination and obliteration of the road, BLM will assess its utility for addition to the BLM transportation system.				
6015	LR:3.3 LR:3.4	All BLM road easements will be maintained to at least minimum BLM roads standards. Where a trail will be included in the transportation system, design and maintenance standards will be developed based on the specific objectives for that trail.				
6016	LR:3.3 LR:3.4	Within the life of the plan, all roads on public land will be inventoried and a transportation plan will be developed to identify roads/trails for closure or maintenance. The plan will include goals, objectives, and maintenance standards for roads/trails to be retained for public use, as well as specific measures to accomplish road closure. Roads/trails that are eroding beyond a reasonable level will be fixed or closed.				
6017	LR:6.1 LR:6.3	Rangeland monitoring will follow the guidelines laid out in the Casper Field Office Monitoring Plan.				

Table 2-3. Detailed Table of Alternatives (Continued)

6000 Land Resources (LR) – Management Actions Common to All Alternatives						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
6018	LR:6.1 LR:6.3	BLM will keep existing management plans (i.e., AMPs, CRMPs, Activity Plans, etc.) current and will implement new management plans where and when needed.				
6019	LR:6.3	Approximately 10 percent of the allotments in the planning area are evaluated each year.				
6020	LR:6.3	Maintenance feeding of forage will not be authorized on public lands.				
6021	LR:6.3	Emergency feeding will be authorized to prevent livestock from declining in health or condition when unforeseen events limit forage available to them. Emergency feeding will be for short periods while the emergency exists or until the livestock can be moved. Require that feed supplement is "weed-free by process" or "certified weed-free," and that instructions for placement and use are stipulated.				
6022	LR:6.1	Base property locations will be recertified only when transferring, consolidating, or dividing grazing preference. A base property requirement of 90 days will be established for the entire planning area. An exception would be made for existing allotments that historically have had less base property than that necessary to meet a 90-day requirement.				
6023	LR:6.1	Category C allotments will be leased year-round at 100 percent federal range unless information is available to indicate a change in authorized grazing use is needed.				
6024	LR:6.1 LR:6.3	Actual use for all Category I and M allotments will be required.				
6025	LR:6.1 LR:6.3	Water developments will be constructed by BLM or constructed by the lessee to BLM standards. Funding and maintenance responsibilities of the water developments will be determined on a case-by-case basis and detailed in the Cooperative Agreement.				
6026	LR:6.1 LR:6.3	BLM funding of major reconstruction projects will be determined on a case-by-case basis.				
6027	LR:7.1	The entire planning area will remain open to dispersed recreation. Emphasis would be placed on providing interpretive and information signs and materials for public land visitors, maintaining existing facilities to a high standard consistent with the recreational setting, and limiting development of additional facilities to those areas where public recreational use of surrounding public lands requires. Work with state, local groups, and adjacent landowners will be conducted to identify and develop recreational trails, both motorized and nonmotorized, when the opportunities presents themselves. SRPs will be allowed for commercial, noncommercial, and competitive events on a case-by-case basis. Cooperation will be maintained with a variety of user groups, especially in the local area, to provide diverse recreational opportunities for enjoyment of public lands. BLM will pursue acquisition of lands and interest in lands in the Rattlesnake Range and Pine Ridge areas, as well as promote and support recreation-based tourism.				
6028	LR:11.1	SRMAs' status may vary by alternative. Selection of a given SRMA will enact specific management prescriptions. Prescriptions for each SRMA include management objectives, targeted outcomes, and implementation actions. Most of the management prescriptions are derived from existing management plans and are carried forward and updated for this RMP. Recreation Area Management Plans for the SRMAs will be developed or otherwise revised as public demand and management needs dictate.				
6029	LR:7.1	**Seminoe/Alcova National Back Country Byway Special Recreation Management Area Prescriptions:** The Casper Field Office will manage the National Back Country Byway in cooperation with the Rawlins Field Office. Encourage and develop cooperative relationships with volunteer groups, landowners and other land management agencies to facilitate responsible recreational use of the area. Maintain the current signs and interpretation along the byway. Currently existing facilities include directional signs. Improvements along the byway will be preceded by formal site plans and will adhere to guidelines developed for the area in the pending RMP. SRPs will be managed cooperatively with the Rawlins Field Office on a case-by-case basis.				
6030	LR:1.1	**Goldeneye Wildlife and Special Recreation Management Area Prescriptions:** The Casper Field Office will maintain and improve currently existing recreation facilities; wildlife improvement projects will be initiated as opportunities arise. The Casper Field Office also will encourage the development of cooperative management strategies and partnerships. SRPs will be allowed for environmental education and outdoor recreation activities for qualified hunting guides only. Work will be conducted to obtain long-term water rights.				
6031	LR:7.1 LR:7.2	**Muddy Mountain Environmental Education Special Recreation Management Area Prescriptions:** The Casper Field Office will maintain existing facilities and evaluate new developments as demand dictates. The EEA will be managed according to the 2000 Muddy Mountain Recreation Area Management Plan. Easements and exchanges will be negotiated to improve public access and recreation opportunities. Seasonal OHV closures will be continued. Campground and day-use fees will be charged. Cooperative management and agreements for the area will be encouraged. SRPs will be allowed for commercial, noncommercial, and competitive events on a case-by-case basis.				
6032	LR:7.1 LR:7.2	**Middle Fork of the Powder River Special Recreation Management Area Prescriptions:** The Casper Field Office would continue to cooperatively manage the area with BLM's Buffalo and Worland field offices to protect and enhance the recreational opportunities; motorized travel would be limited to designated roads and trails and easements and acquisitions will be pursed. Interpretive and access signs will be maintained and improved to inform and educate the public. Seasonal closures will be carried forward and development activities evaluated with special attention to impacts related to visual and recreation resources. SRPs will be managed cooperatively with the Buffalo and Worland field offices on a case-by-case basis. (Note: The Middle Fork of the Powder River SRMA would incorporate decisions related to the South Bighorns ACEC/SMA as it overlaps with differing alternatives.)				

Table 2-3. Detailed Table of Alternatives (Continued)

6000 Land Resources (LR) – Management Actions Common to All Alternatives

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
6033	LR:7.1	**National Historic Trails Special Recreation Management Area Prescriptions:** Cooperative partnerships with volunteer groups, landowners and other land-management agencies will be encouraged and developed to facilitate management and recreational development. SRPs will be allowed for commercial, noncommercial and competitive events on a case-by-case basis. Travel, other than pedestrian, on actual trail ruts is prohibited. Current facilities, signs, and interpretations along trails will be maintained and enhanced as needed. Cooperative management agreement with the NPS will continue. Surface restrictions and other resource allocation decisions are further outlined in the Special Designations section of this document.				
6034	LR:8.1	**North Platte River Special Recreation Management Area Prescriptions:** Development, livestock grazing, and ROW would be limited. Emphasis would be placed on enhancing recreational benefits and wildlife/fisheries habitats within the selected boundary. Acquisitions and easements will be pursued as opportunities arise to improve public access and recreation opportunities. Due to the ACEC evaluation of the North Platte River, detailed management alternatives are located under the Special Designations section of this document. Management of SRPs would be allowed on a case-by-case basis with current and future commercial-use levels being analyzed in the North Platte River SRMA.				
6035	LR:8.1	**Poison Spider OHV Park (Special Recreation Management Area) Prescriptions:** The area will be open to OHV use. The development of cooperative management strategies with volunteer groups, landowners, and other land-management agencies will be encouraged and maintained. Allowances will be made for competitive and educational OHV SRPs. The area will be expanded as determined by the preferred alternative selection. Existing facilities will be maintained. No overnight camping, fires, and shooting of projectiles will be allowed within the park boundaries. A site plan that incorporates needed upgrades and landscape designs will be developed.				
6036	LR:8.1	**South Bighorns/Red Wall National Back Country Byway Prescriptions:** Cooperative relationships with volunteer groups, landowners, and other land-management agencies will be encouraged and developed to facilitate responsible recreation use of the area. SRPs will be allowed for commercial, noncommercial, and competitive events on a case-by-case basis. The current facilities, signs, and interpretations along the byway and at both Grave Springs and Buffalo Creek campgrounds will be maintained. Improvements along the byway will be preceded by formal site plans and will adhere to other guidelines that may be developed in this RMP.				
6037	LR:9.1	OHV use will be managed in accordance with current guidelines that provide for off-road and off-trail travel up to 300 feet for recreational purposes.				

6000 Land Resources (LR) – Lands and Realty

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Retention of Public Lands						
6038	LR:1.1	Retention – approximately 1,248,068 acres of BLM surface.	Retention – approximately 1,236,083 acres of BLM surface.	Retention – approximately 1,114,064 acres of BLM surface.	Retention – approximately 1,131,290 acres of BLM surface.	Same as Alternative D.
Disposal of Public Lands						
6039	LR:1.1 LR:1.2	Dispose of 103,725 acres of public land by sale, exchange, or other means.	Dispose of 109,210 acres of public land by sale, exchange, or other means.	Dispose of 241,364 acres of public land by sale, exchange, or other means.	Dispose of 224,834 acres of public land by sale, exchange, or other means.	Same as Alternative D.
6040	LR:1.1 LR:1.2	Restricted Disposal – dispose of 9,784 acres on a restricted basis.	Restricted Disposal – dispose of 16,344 acres on a restricted basis.	Restricted Disposal – dispose of 6,149 acres on a restricted basis.	Restricted Disposal – dispose of 5,453 acres on a restricted basis.	Same as Alternative D.

Table 2-3. Detailed Table of Alternatives (Continued)

6000 Land Resources (LR) – Lands and Realty						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
6041	LR:1.1 LR:1.2	Dispose of lands around communities on a case-by-case basis.	Dispose of lands around communities by sale, exchange, or other means that are critical and suitable to meet community expansion needs. These lands will be identified on a case-by-case basis.	Dispose of lands within a 5-mile buffer of communities by sale, exchange, or other means to meet community expansion needs. Proposals will be evaluated on a case-by-case basis to ensure compatibility with resources and other land uses. Communities include incorporated and unincorporated cities and towns, as well as other areas of residential development or subdivisions as they exist now or as they develop. Disposal will give first consideration to meet public-purpose-oriented community expansion needs.	Same as Alternative C.	Same as Alternative C.
Acquisition of Land – Management actions related to acquisitions can be found under the individual resource headings.						
Land-Use Authorizations						
6042	LR:1.3	Respond to specific proposals for land-use authorization on a case-by-case basis. Leases and permits will be permitted if the lands are suitable for agricultural development. Lands in the Buffalo Creek area would be available, but only by lease. BLM-administered surface adjacent to big game winter ranges will not be used for agricultural purposes.	Prohibit land-use authorization under FLPMA Section 302(b) leases and permits with the exception of sites required to meet critical management needs.	Allow land-use authorizations under FLPMA Section 302(b) leases and permits to meet public demand. Evaluate on a case-by-case basis as proposals are presented. Potential lease and permit areas may include, but are not limited to the following: • Areas where there are documented or existing trespass facilities that can be resolved by an authorization under this section • Areas along major highways where developments may facilitate public needs • Areas in or adjacent to residential, agricultural, commercial, or industrial developments	Same as Alternative C.	Same as Alternative C.
BLM Withdrawals - Additional BLM withdrawals can be found under the individual resource headings.						
6043	LR:1.4	**Fremont Canyon** The Fremont Canyon C&MU classification (1,261 acres) will be terminated.	**Fremont Canyon** Terminate the existing C&MU classification and pursue a withdrawal on 1,261 acres (same as Alternative A). The withdrawal will segregate from operation of the public land laws, including the mining laws, but not the mineral leasing laws.	**Fremont Canyon** Terminate the existing C&MU classification on 1,261 acres opening this land to operation of the public land laws, including the mining laws.	**Fremont Canyon** Same as Alternative C.	**Fremont Canyon** Same as Alternative B.
6044	LR:1.4	**Public Water Reserves** Continue the existing withdrawal on 1,389 acres. The withdrawal segregates from operation of the public land laws, but not the mining or mineral leasing laws.	**Public Water Reserves** Same as Alternative A.	**Public Water Reserves** Same as Alternative A.	**Public Water Reserves** Revoke the withdrawal on 1,389 acres opening this land to operation of the public land laws.	**Public Water Reserves** Same as Alternative A.

Table 2-3. Detailed Table of Alternatives (Continued)

6000 Land Resources (LR) – Lands and Realty						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
6045	LR:1.4	**Recreation & Public Purposes** Continue the existing segregation on 3,468 acres. These lands are segregated from operation of the public land laws, including the mining laws. Lands leased under the R&PP Act are segregated from operation of the mining laws.	**Recreation & Public Purposes** Same as Alternative A.	**Recreation & Public Purposes** Same as Alternative A.	**Recreation & Public Purposes** Terminate the existing segregation on 3,162 acres patented under the R&PP Act opening these lands to operation of the mining laws. Continue the existing segregation of 306 acres of R&PP Act-leased lands. Lands leased under the R&PP Act are segregated from operation of the mining laws.	**Recreation & Public Purposes** Same as Alternative A.
6046	LR:1.4	**Exchange Land** Continue the existing segregation of 10,566 acres. These lands are segregated from operation of the public land laws, including the mining laws.	**Exchange Land** Same as Alternative A.	**Exchange Land** Same as Alternative A.	**Exchange Land** Terminate the existing segregation of 10,566 acres opening these lands to operation of the mining laws authorized November 21, 2000, 43 CFR 3809.2(a).	**Exchange Land** Same as Alternative D.
6047	LR:1.4	**Sale Land** Continue the existing segregation of 1,219 acres. These lands are segregated from operation of the public land laws, including the mining laws.	**Sale Land** Same as Alternative A.	**Sale Land** Same as Alternative A.	**Sale Land** Terminate the existing segregation of 1,219 acres opening these lands to operation of the mining laws authorized November 21, 2000, 43 CFR 3809.2(a).	**Sale Land** Same as Alternative D.
6048	LR:1.4	**Coal Classification** Continue the existing classification on 417,000 acres. The classification segregates against disposal and nonmetalliferous mineral location.	**Coal Classification** Same as Alternative A.	**Coal Classification** Same as Alternative A.	**Coal Classification** Revoke the existing classification on 417,000 acres, opening this land to disposal and nonmetalliferous mineral location.	**Coal Classification** Same as Alternative D.
Other Agency Withdrawals						
6049	LR:1.4	**Air Navigation Site** Continue the existing withdrawal on 198 acres. These lands are segregated from operation of the public land laws, including the mining laws.	**Air Navigation Site** Same as Alternative A.	**Air Navigation Site** Same as Alternative A.	**Air Navigation Site** Same as Alternative A.	**Air Navigation Site** Same as Alternative A.
6050	SD:15	**The Fort Laramie National Historic Site** Continue the existing withdrawal on 792 acres. The withdrawal segregates from operation of the public land laws including the mining and mineral leasing laws.	**The Fort Laramie National Historic Site** Continue the existing withdrawal on 792 acres and enlarge the withdrawal by 148 acres to 940. acres. The withdrawal segregates from operation of the public land laws including the mining and mineral leasing laws, as would the enlargement.	**The Fort Laramie National Historic Site** Same as Alternative B.	**The Fort Laramie National Historic Site** Same as Alternative B.	**The Fort Laramie National Historic Site** Same as Alternative B.
6051	LR:1.4	**National Wildlife Refuge** Continue the existing withdrawal on 7,458 acres. These lands are segregated from operation of the public land laws, including the mining laws.	**National Wildlife Refuge** Same as Alternative A.	**National Wildlife Refuge** Same as Alternative A.	**National Wildlife Refuge** Revoke the existing withdrawal on 7,458 acres. Revocation would return jurisdiction to the BLM and open the land to operation of the public land laws, including the mining and mineral leasing laws.	**National Wildlife Refuge** Same as Alternative A.

Table 2-3. Detailed Table of Alternatives (Continued)

6000 Land Resources (LR) – Lands and Realty						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
6052	LR:1.4	**Naval Petroleum Reserve No. 3** Continue the existing withdrawal on 9,324 acres. These lands are segregated from operation of the public land laws, including the mining and mineral leasing laws.	**Naval Petroleum Reserve No. 3** Same as Alternative A.	**Naval Petroleum Reserve No. 3** Same as Alternative A.	**Naval Petroleum Reserve No. 3** Same as Alternative A.	**Naval Petroleum Reserve No. 3** Same as Alternative A.
6053	LR:1.4	**National Forest** Continue the existing withdrawal on 81,768 acres.	**National Forest** Same as Alternative A.	**National Forest** Same as Alternative A.	**National Forest** Same as Alternative A.	**National Forest** Same as Alternative A.
6054	LR:1.4	**National Grasslands** Continue the existing withdrawal on 163,238 acres.	**National Grasslands** Same as Alternative A.	**National Grasslands** Same as Alternative A.	**National Grasslands** Same as Alternative A.	**National Grasslands** Same as Alternative A.
6055	LR:1.4	**Camp Guernsey** Continue the existing withdrawal on 5,620 acres. The existing withdrawal segregates from operation of the public land laws, including the mining and mineral leasing laws.	**Camp Guernsey** Continue the existing withdrawal on 5,620 acres and enlarge the withdrawal by 6,230 acres to 11,850 acres. The existing withdrawal segregates from operation of the public land laws, including the mining and mineral leasing laws, as would the enlargement.	**Camp Guernsey** Same as Alternative B.	**Camp Guernsey** Same as Alternative A.	**Camp Guernsey** Same as Alternative B.
6056	LR:1.4	**Reclamation** Continue the existing withdrawals on 18,078 acres. The existing withdrawal segregates from operation of the public land laws, including the metalliferous mining laws.	**Reclamation** Same as Alternative A.	**Reclamation** Same as Alternative A.	**Reclamation** Same as Alternative A.	**Reclamation** Same as Alternative A.
6057	LR:1.4	**Spook Site Uranium Mill Tailings** Continue the existing withdrawal on 90 acres. The withdrawal segregates from operation of the public land laws including the mining laws, and restricts mineral leasing.	**Spook Site Uranium Mill Tailings** Same as Alternative A.	**Spook Site Uranium Mill Tailings** Same as Alternative A.	**Spook Site Uranium Mill Tailings** Same as Alternative A.	**Spook Site Uranium Mill Tailings** Same as Alternative A.
6058	LR:1.4	**UMETCO Gas Hills Uranium Mill Tailings** No similar action.	**UMETCO Gas Hills Uranium Mill Tailings** A withdrawal on 987 acres would be pursued. The withdrawal would segregate from operation of the public land laws including the mining laws, and would restrict mineral leasing.	**UMETCO Gas Hills Uranium Mill Tailings** Same as Alternative B.	**UMETCO Gas Hills Uranium Mill Tailings** Same as Alternative B.	**UMETCO Gas Hills Uranium Mill Tailings** Same as Alternative B.
6059	LR:1.4	**Power Site** Continue the existing withdrawal on 29 acres. The withdrawal segregates from operation of the public land laws, but not the mining or mineral leasing laws.	**Power Site** Same as Alternative A.	**Power Site** Same as Alternative A.	**Power Site** Same as Alternative A.	**Power Site** Same as Alternative A.

Table 2-3. Detailed Table of Alternatives (Continued)

6000 Land Resources (LR) – Renewable Energy						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
6060	LR:2	No specific current management action exists. Respond to specific proposals for renewable energy development on a case-by case-basis.	Renewable wind-energy development would be allowed in areas identified as having outstanding/superb potential (also known as power classes 6 and 7). Development outside those areas would not be allowed. Solar-energy development would be evaluated on a case-by-case basis. Outstanding/superb potential areas (power classes 6 and 7), where wind development would be allowed contain 146,129 acres of public surface. Avoidance and exclusion areas to be implemented under this alternative are the areas identified as necessary for the protection of specific resource values or uses (see Biological Resources and Special Designations). Exclusion areas for renewable wind energy development contain 89,356 acres of public surface. Renewable wind energy development avoidance areas comprise 29,768 acres of public surface.	Renewable wind-energy development would be allowed in areas identified as having outstanding/superb (power classes 6 and 7) or fair/good/excellent (power classes 3, 4, and 5) Potential. Solar-energy development would be evaluated on a case-by-case basis. Outstanding/superb (power classes 6 and 7) and fair/good/excellent (power classes 3, 4 and 5) potential areas where wind development would be allowed are estimated to contain 1,145,597 acres of public surface. Avoidance and exclusion areas to be implemented under this alternative are the areas identified as necessary for the protection of specific resource values or uses (see Biological Resources and Special Designations). Exclusion areas for renewable wind energy development contain 276,287 acres of public surface. Renewable wind energy development avoidance areas comprise 561,750 acres of public surface.	Actively market areas identified as having potential for renewable energy to prospective developers. Under this alternative, any area with fair/good/excellent (power classes 3,4 and 5) or better potential for wind-energy development would be included (1,145,597 public surface acres). The acreage identified for Alternative C applies to this alternative as well. Avoidance and exclusion areas to be implemented under this alternative are the areas identified as necessary for the protection of specific resource values or uses (see Biological Resources and Special Designations). Exclusion areas for renewable wind energy development contain 422,761 acres of public surface. Renewable wind energy development avoidance areas comprise 181,606 acres of public surface.	Same as Alternative C except exclusion areas for renewable wind energy development contain 458,006 acres of public surface, and wind energy development avoidance areas comprise 363,578 acres of public surface.

Table 2-3. Detailed Table of Alternatives (Continued)

6000 Land Resources (LR) – Rights-of-Way (ROW) and Corridors						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
Corridors						
6061	LR:3.1	**Existing Corridors** The Oregon Trail corridor, four existing corridors, and the new Lost Cabin-Arminto Road corridor will be designated in accordance with 43 CFR 2806. Except for the new Oregon Trail location, each designation will include the same types of facilities that are present within the corridor. The corridors are as follows: • Lost Cabin-Arminto Road • Oregon Trail (Segments A, B, and C) • Poison Spider Road • U.S. Highway 20-26 • Wyoming Highway 259/U.S. 87 • Wyoming Highway 387. These existing designated ROW corridors impact federal surface only, as listed in Appendix W, Table 1, Alternative A. The corridors include 347,098 acres, of which 92,113 acres are federal surface.	**Existing Corridors** These existing corridors are the preferred locations for adjacent placement of future ROW. Continue the designated corridors, except as noted for the Oregon Trail Road ROW Corridor, Segment A, described in Alternative A. The corridors include 328,828 acres, of which 86,665 acres are federal surface. See Appendix W, Table 1, Alternative B, for details.	**Existing Corridors** Maintain all currently designated corridors as described in Appendix W, Table 1, Alternative C, but remove all special restrictions that apply to types of use/facilities on the corridors, except as noted for the Oregon Trail Road ROW Corridor, Segment A. The corridors include 347,098 acres, of which 92,113 acres are federal surface. The widths/size of designated corridors will not change under this alternative.	**Existing Corridors** Remove all corridor designations (except as noted for the Oregon Trail Road ROW Corridor, Segment A) and evaluate all future ROW development on a case-by-case basis. Under this alternative, no federal acreage would be included in a designated corridor.	**Existing Corridors** Same as Alternative C, except special restrictions applying to types of use/facilities on the corridors described in Appendix W, Table 1, Alternative E, would be removed on a case-by-case basis.
6062	LR:3.1	**Existing Oregon Trail Road ROW Corridor, Segment A** The existing Oregon Trail Road ROW Corridor, Segment A designation would be continued.	**Existing Oregon Trail Road ROW Corridor, Segment A** Remove the Oregon Trail Road ROW Corridor, Segment A designation and restrict future use in that corridor to operation and maintenance of existing facilities. Designate a corridor to replace the Oregon Trail Road Corridor, Segment A to be called the Cabin Creek Corridor. (40,404 acres of which 23,772 acres are federal surface). See Appendix W, Table 1, Alternative B, for details.	**Existing Oregon Trail Road ROW Corridor, Segment A** Oregon Trail Road ROW Corridor, Segment A would be maintained to allow for additional ROW facilities provided they are subsurface, surface, or low profile developments. ROW facilities that introduce visual intrusions on the skyline along the corridor will not be allowed.	**Existing Oregon Trail Road ROW Corridor, Segment A** The corridor designation for the Oregon Trail Road ROW Corridor, Segment A would be removed, and all future ROW development would be evaluated on a case-by-case basis.	**Existing Oregon Trail Road ROW Corridor, Segment A** Same as Alternative C, except (1) special restrictions applying to types of use/facilities on the corridors would be removed on a case-by-case basis, and (2) a new corridor, to be called the Cabin Creek Corridor, would be designated. See Appendix W, Table 1, Alternative E, for details.
6063	LR:3.1	**Future Corridor Adjustments and New Corridor Designations** Future corridor adjustments and new corridor designations will be made only when facility placement within an existing designated corridor is incompatible, unfeasible, or impractical and when the environmental consequences can be adequately mitigated. Problems of technical compatibility between facilities and spacing of facilities in corridors will be solved on a case-by-case basis.	**Future Corridor Adjustments and New Corridor Designations** Future corridor adjustments and new corridor designations will be made only when facility placement within an existing designated corridor is incompatible, unfeasible, or impractical and when the environmental consequences can be adequately mitigated. Problems of technical compatibility between facilities and spacing of facilities in corridors will be solved on a case-by-case basis.	**Future Corridor Adjustments and New Corridor Designations** Same as Alternative B.	**Future Corridor Adjustments and New Corridor Designations** No future corridor designations would be made.	**Future Corridor Adjustments and New Corridor Designations** Same as Alternative B, except special restrictions applying to types of use/facilities on the corridors would be removed on a case-by-case basis.

Table 2-3. Detailed Table of Alternatives (Continued)

6000 Land Resources (LR) – Rights-of-Way (ROW) and Corridors						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
Right-of-Way Use Areas						
6064	LR:3.1	The Alcova Area Communication Site window would continue. This communication site window designates three sites on public lands that are preferred locations for adjacent placement of future communication site ROW as described in Appendix W, Table 1, Alternative A. Proposed communication site facilities should be designed for compatibility with existing facilities at these three sites. The designation of these communication site windows (ROW use areas) did not specify a boundary or buffer. One of the sites contains three users with their own buildings and facilities, contained within an area less than 3 acres. Under current guidance philosophy, it is estimated that an area between 5 and 10 acres per window is a more than sufficient area within which to address facility compatibility issues during project design.	In addition to continuing the existing Alcova Area Communication Site window (which contains three sites described in Appendix W, Table 1, Alternative B), five new communication site windows (ROW use areas) will be designated in accordance with 43 CFR 2806. These new communication site windows will designate the five sites on public land listed in Appendix W, Table 1, Alternative B. These communication site windows are the required locations for adjacent placement of future communication site ROWs. Proposed communication site facilities should be designed for compatibility with existing facilities located in these sites. Communication sites outside these six windows (eight sites) will not be allowed. The communication site windows will be called by the following names: • Alcova Area Communication Site • Twenty-Mile Hill Communication Site • Arminto Communication Site • Maverick Butte Communication Site • Hell's Half-Acre Communication Site • Dry Creek Road Communication Site. Under this alternative, the estimated acreage per window is the same as described in Alternative A.	Maintain the communication site window (ROW use area) designations as described in Appendix W, Table 1, Alternative C, as the preferred locations for adjacent placement of future communication site ROW. Proposed communication site facilities should be designed for compatibility with existing facilities at these three sites. Evaluate all future communication site ROW on a case-by-case basis.	Remove all communication site window (ROW use area) designations and evaluate all future communication site ROW on a case-by-case basis. Under this alternative, no federal acreage would be included in a designated ROW corridor use area (communication site window).	Same as Alternative C, except in addition to continuing the existing Alcova Area Communication Site window (which contains three sites described in Appendix W, Table 1, Alternative E), five new communication site windows (ROW use areas) will be designated in accordance with 43 CFR 2806. These new communication site windows will designate the five sites on public land described in Appendix W, Table 1, Alternative E. These communication site windows are the preferred locations for adjacent placement of future communication site ROW. Proposed communication site facilities should be designed for compatibility with existing facilities located at these sites. The communication site windows will be called by these names: • Alcova Area Communication Site • Twenty-Mile Hill Communication Site • Arminto Communication Site • Maverick Butte Communication Site • Hell's Half-Acre Communication Site • Dry Creek Road Communication Site.
Avoidance and Exclusion Areas						
6065	LR:3.2	Restrictions on placement of ROW would continue. Exclusion areas for ROW contain 208,664 acres of public land. ROW avoidance areas comprise 723,619 acres of public land. Details on the existing restrictions are in Appendix W, Table 1, Alternative A.	The existing restrictions on placement of ROW will not be carried forward. The ROW avoidance and exclusionary areas to be implemented under this alternative are the areas identified as necessary for the protection of specific resource values or uses (see Biological Resources and Special Designations). Exclusion areas for ROWs contain 1,099,606 acres of public land. ROW avoidance areas comprise 167,379 acres of public land.	The existing restrictions on placement of ROW will not be carried forward. The ROW avoidance and exclusionary areas to be implemented under this alternative are the areas identified as necessary for the protection of specific resource values or uses (see Biological Resources and Special Designations). Exclusion areas for ROWs contain 676,193 acres of public land. ROW avoidance areas comprise 311,758 acres of public land. These areas are shown on Map 45.	The existing restrictions on placement of ROW will not be carried forward. The ROW avoidance and exclusionary areas to be implemented under this alternative are the areas identified as necessary for the protection of specific resource values or uses (e.g., see Biological Resources and Special Designations). Exclusion areas for ROWs contain 238,013 acres of public land. ROW avoidance areas comprise 489,922 acres of public land.	The existing restrictions on placement of ROW will not be carried forward. Exclusion areas for ROW contain 442,040 acres of public land. ROW avoidance areas comprise 539,799 acres of public land.
Rights-of-Way						
6066	LR:3.2	When placement of a major facility within a designated corridor is not possible, and for smaller ROW facilities, placement will be adjacent to existing facilities or disturbances. Cross-country ROW placements will be allowed only when placement in a designated corridor or adjacent to an existing facility is not practical or feasible (from the ROD, RMU14, March 8, 2004 version).	Limit smaller ROW to existing designated corridors or ROW use areas and allow no cross-country ROW alignment.	Limit placement of smaller ROW facilities to be adjacent to existing facilities or disturbances. Cross-country ROW placement will be allowed only when placement in a designated corridor or adjacent to an existing facility is not practical or feasible.	Consider smaller ROW on a case-by-case basis with no "corridor" alignment or site location restrictions.	Same as Alternative A.

Table 2-3. Detailed Table of Alternatives (Continued)

6000 Land Resources (LR) – Transportation						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
6067	LR:1.1	Pursue acquisition of 16 easements for access on approximately 36 miles of private land.	Same as Alternative A.	Pursue acquisition of eight easements for access on approximately 25 miles of private land.	Pursue acquisition of easements only where needed to meet critical resource needs. Critical resource needs would be identified on a case-by-case basis and could include lack of access to large blocks of inaccessible public land where public demand for such access is strongly expressed on a regular basis, or where legal access restricts or prohibits development of facilities that are deemed necessary to meet growing public demand, such as additional campgrounds in highly used areas.	Negotiate and acquire easements to public lands where legal access is needed for resource management and public access purposes. This would be an ongoing effort for the life of the RMP. Access needs would be identified on a case-by-case basis.

6000 Land Resources (LR) – Off-highway Vehicles (OHVs)						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
Limited to Existing Roads and Trails						
6068	LR:4.2 LR:4.3 LR:4.7 LR:5.2	On the majority of the planning area, OHV use is limited to existing roads and trails. OHVs are limited to existing roads and trails (approximately 1,311,715 acres).	OHVs are limited to existing roads and trails (approximately 909,651 acres). Transportation planning will be ongoing: • Unauthorized roads/trails that are developed during the life of this plan will be closed, barricaded (if necessary), and signed accordingly. • Exiting roads and trails that are determined by resource specialists to be unduly detrimental to other resource values or pose a safety risk will be rerouted or closed, whichever is most prudent. • Authorized engineered roads may be incorporated into the existing road network if they provide additional public access or a reliable alternative to less-reliable roads/trails; otherwise, these roads will be rehabilitated and closed after use. No similar action.	OHVs are limited to existing roads and trails (approximately 1,162,113 acres). Transportation planning will be ongoing: Same as Alternative B Same as Alternative B Same as Alternative B Allow for special permits for disabled individuals within areas that are limited to existing roads and trails.	Limited to existing roads and trails (approximately 1,292,630 acres). Same as Alternative C.	OHVs are limited to existing roads and trails (approximately 1,162,244 acres). Transportation planning will be ongoing: • Off-road travel will be allowed up to 300 feet from roads for camping, recovering game animals, collecting fire wood, picnicking, or other uses that do not require specific authorizations or permits as long as resource damage does not occur or new routes are not created. • Other necessary tasks that require ORV travel may be allowed, as long as resource damage does not occur -or new routes are created. These tasks include, but are not limited to, such activities as geophysical exploration, maintaining range improvements, animal husbandry activities by the grazing lessee and his or her agents, and surveying ROW or other work-related tasks authorized by, or which lead to the issuance, of a permit or authorization. The authorized officer may allow necessary tasks without issuance of a formal permit.

Table 2-3. Detailed Table of Alternatives (Continued)

6000 Land Resources (LR) – Off-highway Vehicles (OHVs)						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
Limited to Designated Roads and Trails						
6069	LR:4.1 LR:4.2 LR:4.3 LR:4.4 LR:4.5 LR:4.6 LR:4.7 LR:5.3 LR:5.2	OHVs limited to designated roads and trails (47,014 acres in the Muddy Mountain EEA, Red Wall, Goldeneye, Sand Hills [formerly Casper Sand Dunes], Jackson Canyon, and along the North Platte River). Red Wall: Transportation plan not completed; OHVs may be used in the Red Wall area only on designated roads and vehicle routes. The Red Wall area will be signed accordingly. Jackson Canyon: Transportation plan not completed; OHV use will be allowed only on designated roads and only from April 1 to October 31. There will be no increase or improvement in roads or legal access. Sand Hills (formerly Casper Sand Dunes), northeast of Casper: Transportation plan not completed; OHV use will be confined to existing roads and trails during big game hunting seasons and on designated roads and trails the rest of the year. The North Platte River (Trappers Route): Transportation plan not completed; OHV use is limited to designated roads and vehicle routes for public land between Alcova and Casper. All roads will be designated for OHV use.	OHV travel within areas containing sensitive resources, such as erosive soils, big game winter range, riparian areas, and developed recreation sites would be limited to designated roads and trails and (or) seasonally closed (425,657 acres). The transportation plans for areas that are limited to designated roads and trails during the RMP will be completed within 5 years of the ROD. The transportation plans would • Include at least one or a combination of two-track trails, designated OHV trails, and BLM-administered roads • Not affect valid existing rights • Limit stream and riparian crossings • Upgrade, reroute, or close roads and trails that cause excessive erosion • Address seasonal closures • Retain existing roads that provide access to commercial forest and woodlands • Sign all closed roads (all other roads/trails would be available for public use) • Carry forward the seasonal restriction for Jackson Canyon.	OHV travel within core areas containing sensitive resources, such as erosive soils, big game winter range, riparian areas, and developed recreation sites would be limited to designated roads and trails and (or) closed or seasonally closed (191,236 acres). Same as Alternative B.	Limited to designated roads and trails (66,001 acres in the Muddy Mountain EEA, Goldeneye, Sand Hills, Red Wall, Jackson Canyon, Middle Fork SRMA, and along the North Platte River). Transportation plans will be completed within 5 years of the ROD. The transportation plans will be completed the same as Alternative B, except for the following: • Sand Hills would be limited to designated roads and trails year-round. The seasonal restriction would not be carried forward. • The prescription to designate all existing roads as open for OHV use along the North Platte River would not be carried forward. • The Alcova Fossil Area will be restricted to designated roads and trails until an inventory can be completed. Areas determined to be sensitive would be closed to OHV use.	Motor vehicle travel in the following areas would be limited to a designated network of roads and trails (196,824 acres): • Sand Hills • Jackson Canyon • North Platte River • Alcova Fossil SMA • South Bighorns/Red Wall • Bates Hole. To determine the authorized road network for the area, the Casper Field Office will complete a Transportation Plan within 5 years of completing this RMP. • Off-road travel will be allowed up to 300 feet from roads for camping, recovering game animals, collecting fire wood, picnicking, or other uses that do not require specific authorizations or permits as long as resource damage does not occur. • Other necessary tasks that require ORV travel may be allowed, as long as resource damage does not occur or new routes are created. These tasks include, but are not limited to, such activities as geophysical exploration, maintaining range improvements, animal husbandry activities by the grazing lessee and his or her agents, and surveying ROW or other work-related tasks authorized by, or which lead to, the issuance of a permit or authorization. The authorized officer may allow necessary tasks without issuance of a formal permit. • Designation is effective of RMP approval/Federal Register notice. • New roads and trails would be approved on a case-by-case basis until completion of the Casper Field Office Transportation Plan.

Table 2-3. Detailed Table of Alternatives (Continued)

6000 Land Resources (LR) – Off-highway Vehicles (OHVs)						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
6070	LR:4.3 LR:4.6 LR:4.7 LR:5.2	Muddy Mountain EEA: Transportation plan completed. Current management allows for 4-½ miles of marked snowmobile trails and designation of cross-country skiing areas (snowmobile closures). Goldeneye Wildlife and Recreation Area: Transportation plan completed. OHV travel in the area is limited to the designated access road only.	Completed transportation plans for areas currently limited to designated roads and trails would be carried forward into the revised RMP with the following changes: • Recreational ATV use would not be allowed within the boundaries of both Rim and Lodgepole campgrounds. • Snowmobile trails on Muddy Mountain would be limited to existing designated snowmobile trails; no additional trails would be permitted.	Same as Alternative B, except the BLM would also develop ATV and motorcycle trails within the Muddy Mountain EEA. The development of ATV trails would be limited to forest management roads within the EEA south and west of the developed area.	Same as Alternative B, except for the following: • The BLM would develop ATV and motorcycle trails within the Muddy Mountain EEA, near Bolten EEA, and east of Casper. Existing trails would be used for this purpose whenever feasible. • The development of snowmobile trails would be limited to forest management roads within the Muddy Mountain EEA south and west of the developed area. • Allow for special permits for disabled individuals within limited to existing category as authorized on a case-by-case basis.	Same as Alternative A with one addition: Temporary roads and trails may be developed for forest management and would be closed and reclaimed when no longer needed.
Designated Open to OHV						
6071	LR:4.1 LR:4.6 LR:5.1 LR:5.2	Poison Spider OHV Park (187 acres) would be designated as open to OHV use (ATV, motorcycles, and 4x4 vehicles).	The Poison Spider OHV Park would be designated as open to OHV use and expanded to include an additional 55 acres (for a total of 242 acres). No additional OHV parks within the Casper planning area.	The Poison Spider OHV Park would be designated as open to OHV use and expanded to include an additional 98 acres (for a total of 285 acres). Same as Alternative B.	Same as Alternative C. Allow for the development of an additional OHV park that would be open to OHV use with an open designation or allow unlimited OHV use after thorough evaluation. No suitable area is currently identified; the Casper Field Office would consider previously disturbed areas as possible locations (this is not an absolute, but may be identified during the life of the plan).	The Poison Spider OHV Park would be open to OHV use. It would be expanded to include an additional 98 acres (for a total of 285 acres). An additional OHV park would be considered. The area would be open to all motor vehicles.
Designated Closed to OHV						
6072	LR:4.3 LR:5.3 LR:5.2	Designate 2,661 acres in the following areas closed to OHV use: • Natural area of the Muddy Mountain EEA (including snowmobile use) • Historic trail sites along the Oregon Trail • Historic trail sites along the Bozeman Trail.	Designate 26,027 acres in the following areas closed to OHV use: • Natural Area of the Muddy Mountain EEA (including snowmobile use) • Historic trail sites along the Oregon Trail • Historic trail sites along the Bozeman Trail • Alcova Fossil Area ACEC. • Sand Hills SMA • All historic trails ruts on BLM-administered public lands (historic trails will be inventoried and closed to OHV use as they are identified as having integrity of trail).	Designate 7,943 acres in the following acres closed to OHV use: • Natural area of the Muddy Mountain EEA (including snowmobile use) • Historic trail sites along the Oregon Trail • Historic trail sites along the Bozeman Trail • Alcova Fossil Area ACEC • All historic trail ruts on BLM-administered public lands (historic trails will be inventoried and closed to OHV use as they are identified as having integrity of trail).	Designate 2,661 acres in the following areas closed to OHV use: • Natural area of the Muddy Mountain EEA (including snowmobile use) • Historic trail sites along the Oregon Trail • Historic trail sites along the Bozeman Trail • Areas within the Alcova Fossil Area SMA determined to be sensitive to damage will be identified and closed to OHV use.	2,224 designated acres in the following areas will be closed to OHV use: • Natural area of the Muddy Mountain EEA (including snowmobile use) • Historic trail sites along the Oregon Trail, except the Ryan Hill and Bessemer Bend sites • Historic trail sites along the Bozeman Trail • All historic trail ruts on BLM-administered public lands (historic trails will be inventoried and closed to OHV use as they are identified as having integrity of trail).

Table 2-3. Detailed Table of Alternatives (Continued)

6000 Land Resources (LR) – Livestock Grazing						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
6073	LR:6.1 LR:6.3	Grazing Lease Administration Leases will be revised as necessary to accommodate increases in AUMs from actual increase in forage. Future upward or downward changes may be allocated to livestock, wildlife, watershed, or a combination of these land uses.	Grazing leases will be adjusted where monitoring, field observations, or other data indicate changes, either increases or decreases, in forage allocation are needed due to more intense management, changes in kind or class of livestock, allocation of forage for other resource uses, availability and/or suitability of forage, as well as other factors.	Same as Alternative B.	Same as Alternative B.	Grazing leases will be adjusted where an evaluation of monitoring, field observations, or other data indicate changes, and either increases or decreases, in forage allocation are needed or when necessary or required by other applicable law or regulation.
6074	LR:6.1 LR:6.3	Conversions in kinds of livestock and changes in season of use are handled on a case-by-case basis. Adjustments to accurately reflect the kind of livestock use being made on public land is not being pursued actively.	Conversions in kinds of livestock and changes in season of use will be considered on a case-by-case basis through an environmental analysis. Such changes will be consistent with wildlife, watershed, riparian, special status species, and vegetation objectives. Grazing leases will be modified when necessary to accurately reflect the kind of livestock use being made on public land in all allotments.	Same as Alternative B, except emphasis would be placed on Category I and M allotments.	Same as Alternative B, except emphasis would be placed on Category I allotments.	Conversions in kinds of livestock and changes in season of use will be considered on a case-by-case basis through an environmental analysis. Such changes will be consistent with rangeland health objectives. Grazing leases would be adjusted to accurately reflect the kind of livestock use on public land in all allotments.
6075	LR:6.3	Prevent overgrazing and downward trend all leases; emphasis will be on Category I and M allotments. This will be done with no adverse impacts to wildlife and watershed values. The preferred alternatives will be ones that are beneficial to wildlife and watershed values.	Prevent improper grazing and downward trend in all grazing allotments; emphasis will be on all grazing allotments.	Same as Alternative B, except emphasis will be on high priority category allotments (i.e., categories I and M).	Same as Alternative B, except emphasis will be on Category I allotments.	Prevent downward trend in all grazing allotments.
6076	LR:6.1	Approximately 1,355,561acres will continue to be open to livestock grazing. 6,016 acres would continue to be closed to livestock grazing (see Appendix H).	Same as Alternative A, except additional areas may be closed to livestock grazing for the protection and management of specific resource values or uses; e.g., sensitive status species on the campgrounds and additional OHV parks.	Same as Alternative B.	Same as Alternative B.	Same as Alternative B.
6077	LR:6.3	Currently, grazing allotments are evaluated to determine if they are meeting the standards for healthy rangelands. Rangeland health evaluations include a determination of soil erosion condition and stability.	Manage livestock grazing to maintain a protective cover of vegetation and litter on all BLM-administered surface in the planning area. All grazing allotments will be monitored every year. Forage utilization will be limited to 40 percent of the current year's production. Management techniques may include herding, fencing, rotational grazing, or limiting season of use to meet the target utilization levels.	Manage livestock grazing to maintain a protective cover of vegetation and litter with emphasis on the condition of allotments with acreages of highly erosive soils. Target forage utilization levels will be established for highly erosive soils and grazing management objectives will be developed to meet those objectives. Management techniques may include herding, fencing, rotational grazing, or limiting season of use to meet the target utilization levels on highly erosive soils.	Place no additional restrictions on livestock grazing in the planning area.	Same as Alternative C.
6078	LR:6.2	**Stock Driveways (SDWs)** SDWs will be utilized to the fullest extent possible and standards will be developed for livestock use other than trailing. Plan Change 34 developed these standards. Actions will be taken to cancel SDW withdrawals for trails that are not active and to fence areas into adjacent allotments and issue grazing leases.	**Stock Driveways (SDWs)** Do not revoke any SDW withdrawals. Retain these areas for this specific use regardless of where they are located or how often they are used for trailing livestock.	**Stock Driveways (SDWs)** Revoke SDW withdrawals for those trails that are no longer active and incorporate these lands into adjacent allotments (46,051 acres). Offer grazing leases to the respective grazing lessees. Retain all remaining SDW lands for trail use (55,680 acres).	**Stock Driveways (SDWs)** Revoke all SDW withdrawals and discontinue trail use (approximately 101,731 acres and 12,725 AUMs). Lease unfenced SDW to adjacent grazing lessees (approximately 58,648 acres and 6,500 AUMs). Retain fenced corridors and leave open or unleased to facilitate management objectives in other grazing allotments (approximately 43,083 acres and 6,225 AUMs).	**Stock Driveways (SDWs)** Review and recommend revocation of withdrawals for those trails that are no longer active and incorporate these lands into adjacent allotments (46,051 acres). Offer grazing leases to the respective grazing lessees. Retain all remaining SDW lands for trail use (55,680 acres).

Table 2-3. Detailed Table of Alternatives (Continued)

6000 Land Resources (LR) – Livestock Grazing						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
6079	LR:6.2	Lightly used trails that are not fenced will be leased to grazing lessee who occupies the adjoining area. AUMs will be reserved for trailing use.	Do not lease infrequently or occasionally used SDWs that currently are unfenced to grazing lessees. Do not fence these lands, but reserve AUMs for trail use.	Fence infrequently or occasionally used SDWs that are currently unfenced and unleased to create corridors for trailing livestock or other management objectives. AUMs on these lands will be reserved for trailing livestock or other resource uses.	Lease unfenced SDWs that are occasionally used for trailing to those grazing lessees whose allotments adjoin the SDWs. Reserve 30 percent of the AUMs for trail use and lease the remaining AUMs to the respective grazing lessees.	Same as Alternative D.
6080	LR:6.2	Trail use, after-trail use, and other trail use on SDWs would be managed in accordance with the standards outlined in Appendix T , Stock Driveway Management Standards – Trail Use.	Current guidelines for administrating SDWs as identified in Appendix T will be modified. After-trail use will no longer be authorized. If additional forage is available on fenced SDWs (reserve allotments), it will be reserved to meet other management objectives, which may include rest following wildfire, prescribed fire, or chemical treatments. Use will follow established criteria and a plan of development.	Current guidelines for administering SDWs as identified in Appendix T for administering SDWs will be modified. After-trail use will no longer be authorized. All forage will be reserved for trail use.	Same as Alternative A. (Current-grazing guidelines as identified in Appendix T for administering SDWs will be carried forward into new plan.)	Same as Alternative D, except Stock Driveway Management Standards – Trail Use would be modified to provide for using trails during periods outside of normal trailing.
6081	LR:6.1	The Casper Field Office has developed guidelines for authorizing yearling conversions.	Do not authorize yearling conversions and terminate existing agreements.	Continue to authorize yearling conversions using existing Casper Field Office criteria. Yearling conversions will be consistent with management objectives and wildlife, watershed, riparian, vegetative values, and other resource values.	Same as Alternative C.	Same as Alternative C.
6082	LR:6.3	Placement of salt, mineral, or forage supplements will be allowed on a case-by-case basis.	Do not allow placement of salt, mineral, or forage supplements for livestock within ½ mile of water, wetlands, and riparian areas, unless NEPA analysis shows that watershed, riparian, wetland, wildlife, and vegetative values would not be adversely impacted. Require that forage supplements be "certified weed-free."	Do not allow placement of salt, mineral, or forage supplements for livestock within ¼ mile of water, wetlands, and riparian areas, unless written analysis shows that watershed, riparian, wetland, wildlife, and vegetative values would not be adversely impacted. Require that forage supplements be "certified weed-free."	Same as Alternative C.	Same as Alternative C.

Table 2-3. Detailed Table of Alternatives (Continued)

6000 Land Resources (LR) – Recreation						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
6083	LR:7.1 LR:7.2	Maintain the following four SRMAs: 1. Muddy Mountain EEA 2. Goldeneye Wildlife and Recreation Area 3. Middle Fork SRMA (cooperatively with the Buffalo and Worland field offices) 4. North Platte River.* *See Special Designations for detailed management actions for the North Platte River.	Maintain the following two SRMAs: 1. Muddy Mountain EEA 2. Middle Fork SRMA (cooperatively with the Buffalo and Worland field offices) Add the following SRMA: 1. Poison Spider OHV Park expanded by 55 acres (for a total of 242 acres). Drop the following SRMA: 1. Goldeneye Wildlife and Recreation Area. The North Platte River* would be managed as an ACEC. Recreation management would be included in the ACEC management plan. *See Special Designations for detailed management actions for the North Platte River.	Maintain the following three SRMAs: 1. Muddy Mountain EEA 2. Middle Fork SRMA (cooperatively with the Buffalo and Worland field offices 3. Goldeneye Wildlife and Recreation Management Area Add the following two SRMAs: 1. Poison Spider OHV Park expanded by 98 acres (285 acres). 2. NHTs. The North Platte River* would be managed as an ACEC between Pathfinder Dam and the Dave Johnston Power Plant. Recreation management would be included in the ACEC management plan. *See Special Designations for detailed management actions for the North Platte River and NHTs.	Maintain the following four SRMAs: 1. Muddy Mountain EEA 2. Goldeneye Wildlife and Recreation Area 3. Middle Fork SRMA (Cooperatively with the Buffalo and Worland field offices) 4. North Platte River* between Pathfinder Dam and Robertson Road in Casper Add the following four SRMAs: 1. Poison Spider OHV Park expanded by 98 acres (for a total of 285 acres) 2. South Bighorns/Red Wall National Back Country Byway 3. Seminoe/Alcova National Back Country Byway (cooperatively with the Rawlins Field Office) 4. NHTs. *See Special Designations for detailed management actions for the North Platte River, NHTs, and National Back Country Byways.	Manage the following six SRMAs: 1. Muddy Mountain EEA 2. Goldeneye Wildlife and Recreation Area 3. Middle Fork SRMA (cooperatively with Buffalo and Worland field offices) 4. North Platte River* between Pathfinder Dam and the Natrona/Converse county line 5. Poison Spider OHV Park expanded by 98 acres (for a total of 285 acres) 6. NHTs *See Special Designations for detailed management actions for the North Platte River and NHTs.
6084	LR:7.1	The SRMA for the Muddy Mountain EEA would continue to be managed in accordance with the 1977 Muddy Mountain Activity Plan as amended by the 2000 Muddy Mountain EEA RAMP. These plans specify NSO within the EEA, except this restriction does not apply to forest and recreation management practices.	The 1977 Muddy Mountain Activity Plan would not be carried forward. The SRMA for the Muddy Mountain EEA would continue to be managed in accordance with the 2000 RAMP, except the area would be closed to oil and gas leasing and geophysical operations.	Same as Alternative B.	Same as Alternative B.	Same as Alternative B.
6085	LR:1.1 LR:7.1	Muddy Mountain EEA A protective withdrawal will be established on the Muddy Mountain EEA on 1,027 acres. The withdrawal will segregate from operation of the public land laws, including the mining laws, but not the mineral leasing laws. The existing C&MU classification will be terminated.	Muddy Mountain EEA Same as Alternative A.	Muddy Mountain EEA Same as Alternative A.	Muddy Mountain EEA Terminate the existing C&MU classification on 1,027 acres, opening this land to operation of the public land laws, including the mining laws.	Muddy Mountain EEA Same as Alternative A.
6086	LR:7.1	The SRMA for the Goldeneye Wildlife and Recreation Area would continue to be managed in accordance with the 1978 RAMP, which specifies the following: 1. NSO within the boundary, unless the development facilitates recreation use or enhances wildlife 2. NSO on BLM-administered surface in Section 7 and 8, T. 35 N., R. 82 3. NSO within ½ mile of the shoreline of the Goldeneye Reservoir 4. NSO within 600 feet of the Middle Fork of Casper Creek or its tributaries.	The SRMA for the Goldeneye Wildlife and Recreation Area would be dropped and the area managed for wildlife with the following NSO. NSO within the boundary, unless the development facilitates recreation use or enhances wildlife.	Same as Alternative B.	The SRMA for the Goldeneye Wildlife and Recreation Area would continue. Only one of the NSOs identified in the 1978 RAMP would be brought forward. NSO within the boundary, unless the development facilitates recreation use or enhances wildlife.	Same as Alternative D.

Table 2-3. Detailed Table of Alternatives (Continued)

6000 Land Resources (LR) – Recreation						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
6087	LR:1-1	Obtain access to the areas identified below: • Muddy Mountain • Bolton Creek Drainage • Bates Creek Area • Rattlesnake Range • Pine Ridge.	Obtain access to the areas identified below, where demand and public use are high: • Bates Creek Area • Rattlesnake Range.	Obtain access to the areas identified below: • Muddy Mountain • Bolton Creek Drainage • Bates Creek Area • Rattlesnake Range • Pine Ridge.	Obtain access to the areas identified below: • Muddy Mountain • Bolton Creek Drainage • Bates Creek Area • Rattlesnake Range • Pine Ridge.	Negotiate easements, where needed, to meet program needs. These needs would be identified on a case-by-case basis.

Table 2-3. Detailed Table of Alternatives (Continued)

7000 Special Designations (SD) – Jackson Canyon ACEC (Existing ACEC)						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
Goal **GOAL SD:1** Maintain bald eagle winter roost habitat within the Jackson Canyon ACEC to facilitate meeting the objectives within the Pacific Bald Eagle Recovery Plan. **OBJECTIVES –** None identified**.**						
Management Actions Common to All Alternatives						
7001	SD:1	Revise the existing boundary by enlarging it approximately ¼ mile to the south, making use of topographic features to screen bald eagle roosts.				
7002	SD:1	Development of existing oil and gas leases will be subject to NSO (which is a condition of the existing leases). All federal mineral estate in the ACEC will be available for oil and gas leasing, with any leases issued subject to an NSO stipulation.				
7003	SD:1	The existing federal mineral estates in the ACEC, and any additional mineral estate that may be acquired in the ACEC, will be withdrawn from location and appropriation under the mining laws. The ACEC is closed to disposal of mineral materials.				
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
7004	SD:1	The Jackson Canyon ACEC completed by the BLM was carried forward into the 1985 RMP. Management prescriptions for this area can be found in the Jackson Canyon ACEC and Bald Eagle HMP.	Retain the Jackson Canyon ACEC using the proposed adjustments in the management actions below.	Same as Alternative B.	Same as Alternative B.	Same as Alternative A, except as adjusted below in records 7007, 7010, 7013, and 7014.
7005	SD:1	Access. A 60-foot-wide road to the archery range on public land now under R&PP Act lease to the Girl Scouts, proposed for construction by the Natrona County Parks Department, may be authorized by ROW. The 60-foot width should meet requirements under state law for subdivision access; such ROW will allow year-round occupancy.	Upgrading the existing road to the archery range to a 60-foot width will not be allowed. Upgrading is limited to the BLM's "Resource road" standard (14-foot travel way width and total ROW of 40-50-foot width) on public lands (BLM Manual Section 9113).	Same as Alternative B.	Same as Alternative A.	Same as Alternative A.
7006	SD:1	Exchange will be pursued to acquire all State of Wyoming lands within or adjacent to the ACEC; public lands located outside the ACEC (to be identified by the State of Wyoming) would be disposed of by exchange to the State of Wyoming. This decision includes disposal by exchange to the State of Wyoming of public lands outside the ACEC boundary that contain limestone deposits (T. 32 N., R, 80 W., Sections 27, 28 and 34). Some of the state lands adjacent to the ACEC that were identified during preliminary BLM-state exchange negotiations are located in Sections 2, 3, and 4 of T. 31 N., R. 80 W., and in Sections 28 and 29 of T. 32 N., R. 80 W. If limestone mining is proposed on the exchanged lands, those actions will be subject to access and blasting limitations from November 1 through March 31.	Acquisition of lands through exchange would not be pursued. Only conservation easements or the acquisition of State of Wyoming lands within or adjacent to the ACEC would be pursued.	Same as Alternative B.	Same as Alternative A.	Same as Alternative A.

Table 2-3. Detailed Table of Alternatives (Continued)

7000 Special Designations (SD) – Jackson Canyon ACEC (Existing ACEC)						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
7007	SD:1	Forestry. The acreage and volume identified for harvest within the ACEC, including the 163 acres of remaining commercial forest, will not be harvested for BLM's commercial base. Timber within the ACEC will not be harvested for commercial purposes, but will be actively managed.	Same as Alternative A.	Same as Alternative A.	Commercial harvest will be allowed to meet bald eagle management objectives. Commercial harvesting will not be allowed merely to meet BLM's commercial harvest quotas.	Forest harvesting will be allowed to reduce fuel loads and disease while meeting bald eagle management objectives. All constructed roads would be closed and reclaimed.
7008	SD:1	Fire Management: All federal lands within or adjacent to the ACEC will be designated priority full suppression. Priority full suppression may include full suppression of wildfires with all available resources, including vehicle use on existing roads and trails, air support, construction of roads, and grading of firebreaks using heavy equipment. Any surface disturbance resulting from suppression efforts will be restored and reclaimed immediately after a fire is suppressed. To the extent possible, trees will not be cut down within 200 yards of the bald eagle roosts during fire suppression.	Same as Alternative A, except road construction will not be allowed.	Same as Alternative B.	Same as Alternative A.	Same as Alternative A.
7009	SD:1	Fire management plans will identify areas where grading of roads and (or) firebreaks are most needed for fire suppression, as well as will identify those areas where protection from wildfires is most critical.	Same as Alternative A, except grading of roads will not be allowed.	Same as Alternative B.	Same as Alternative B.	Same as Alternative A.
7010	SD:1	Prescribed burning will be implemented, where necessary, to meet range and forest resource management objectives, but it will not be allowed from November 1 through March 31.	Prescribed fire will be used to meet bald eagle habitats, livestock grazing, and forestry objectives. A seasonal restriction to protect bald eagles would be in accordance with Section 7 consultation with the USFWS.	Same as Alternative B.	Same as Alternative B.	Prescribed fire will be used to meet bald eagle habitats, livestock grazing, fuels management, and forestry objectives. Exceptions to the existing seasonal restriction of November 1 through March 31 to protect bald eagle roosting habitats would be granted on a case-by-case basis after consultation with the USFWS.
7011	SD:1	ACEC Boundary Adjustments: Mineral materials located outside the revised ACEC boundary (as identified above) will be available for development to extract limestone or other salable minerals without seasonal or occupancy restrictions. Those lands will be subject to access and blasting limitations from November 1 through March 31.	Same as Alternative A.	Mineral materials located outside the ACEC boundary would be considered on a case-by-case basis.	Same as Alternative C.	Same as Alternative A.
7012	SD:1	The existing ACEC boundary in the eastern portion of the area will be revised by reducing it (by approximately 1,400 acres) to the township line between range 79 and 80 west, making it the eastern ACEC boundary (ACEC Map 58).	To meet the bald eagle habitat objective on spilt estate lands, the existing ACEC boundary in the eastern portion of the area will not be revised by reducing it (by approximately 1,400 acres) to the township line between range 79 and 80 west.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.

Table 2-3. Detailed Table of Alternatives (Continued)

7000 Special Designations (SD) – Jackson Canyon ACEC (Existing ACEC)

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
7013	SD:1	Silvicultural practices (thinning and mountain pine beetle management) would continue to be implemented to achieve species diversity and to obtain healthy-aged and structured stands for the benefit of bald eagle roosting habitats.	Same as the Alternative A, existing roads and trails would be used to haul wood products.	Allow forest treatments within bald eagle roost areas and manage stands in roost areas for old growth. Limit commercial harvest of wood products to a single contractor for each commercial harvest at any given time. Construct the necessary amount of roads and trails to promote forest management and product removal.	Maximize harvest of wood products within bald eagle roost areas. Allow road and trail infrastructure, as needed, to remove forest products. Limit forest management and product sales to nonroosting periods.	Same as Alternative C, except after completing activities, all roads and trails will be closed and reclaimed.
7014	SD:1	Obtain access to the areas identified below. Jackson Canyon	No similar action.	Obtain access to the areas identified below. Jackson Canyon	Obtain access to the areas identified below. Jackson Canyon	Negotiate easements, where needed, to meet program needs. These needs would be identified on a case-by-case basis.

7000 Special Designations (SD) – Salt Creek Hazardous ACEC (Existing ACEC)

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Goal **GOAL SD:2** Reduce environmental damage or associated impacts from mineral production in the Salt Creek drainage, which will improve air and water quality, promote public safety, increase resource utility, improve the visual resource, and enhance vegetative growth. Negotiate with oil companies to develop preventative maintenance to eliminate environmental hazards from oil spills. Secure cooperative agreements with the Naval Petroleum Reserve and private and state mineral owners to clean up environmental hazards in the ACEC area **OBJECTIVES –** None identified**.**						
Management Actions Common to All Alternatives No Management Actions Common to All Alternatives identified.						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
7015	SD:2	The Salt Creek Hazardous ACEC, completed by the BLM, was carried forward into the 1985 RMP. Management prescriptions for this area can be found in the Salt Creek Hazardous ACEC designation.	Retain the Salt Creek Hazardous ACEC and implement stream monitoring, monitor produced water discharge, and conduct annual field inspections. Conduct a cultural resource inventory and evaluate historical oil and gas sites, structures, and town sites that may be eligible for the nomination to the National Register. Secure cooperative agreements with developers of state and privately owned oil and gas to clean up existing hazards in the ACEC area.	Modify the Salt Creek Hazardous ACEC by amending the plan to cover those functions that are within the jurisdiction of the BLM. Reduce the aerial extent of the ACEC to those lands within the jurisdiction of the Casper Field Office. (Note: the portion of the original ACEC in Johnson County is not retained in the present Buffalo RMP.)	Do not retain the Salt Creek Hazardous ACEC designation. Address environmental hazards on a case-by-case basis and work with operators to clean up and reclaim environmental hazards.	Same as Alternative D, except a weed-management plan would be implemented in accordance with decisions made in the INPS alternatives.

Table 2-3. Detailed Table of Alternatives (Continued)

7000 Special Designations (SD) – Alcova Fossil Area (Proposed ACEC or SMA)

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Goal **Goal SD:3** Manage BLM paleontological resources in the Alcova Fossil Area to enhance their informational, educational, scientific, and recreational uses. **OBJECTIVES –** None identified**.**						
Management Actions Common to All Alternatives: No Management Actions Common to All Alternatives identified.						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
7016	SD:3	The Alcova Fossil Area will be evaluated for significant paleontological resources. NSO would be allowed inside areas with significant paleontological resources. Refer to Appendix W for legal descriptions of the identified lands.	The Alcova Fossil Area will be designated as an ACEC. Preservation of the paleontological resources will be encouraged by prohibiting all surface-disturbing activities (NSO) except those in support of scientific research. The area will be closed to OHV use. No visitor facilities or development will be done in the area. A management plan will be written to identify long-term goals for management and determine allowable activities. The area for designation includes public lands on the north and south sides of Alcova Reservoir (7,073 total acres, of which 5,981 are BLM-administered surface). Refer to Appendix W for legal descriptions of the public lands.	The Alcova Fossil Area will be designated as an ACEC. Preservation of the paleontological resources will be encouraged by minimizing all surface-disturbing activities (CSU) except those in support of scientific research. The area will be closed to OHV use. Visitor interpretation and education facilities will be minimal, using offsite or nearby signs or kiosks. A management plan will be written for any development and to identify long-term goals for management. The area for designation includes public lands only on the south side of Alcova Reservoir (5,963 total acres, of which 5,282 are BLM-administered surface). Refer to Appendix W for legal descriptions of the public lands.	The Alcova Fossil Area will be managed as an SMA. Other resource activities will be allowed to occur only if they do not cause undue degradation to the paleontological resources present in the area. Areas determined to be sensitive to damage will be identified and closed to OHV use. Scientific research will be encouraged. Visitor interpretation and education facilities (e.g., trails, interpretive signs, and kiosks) will be encouraged. A cooperative management approach will be formulated with the USBR and other parties, as appropriate. A management plan will be written only if public facilities will be considered. The area for designation includes public lands only on the south side of Alcova Reservoir (5,963 total acres, of which 5,282 are BLM-administered surface). Refer to Appendix W for legal descriptions.	The Alcova Fossil Area will be designated as an ACEC. Proposed surface-disturbing activities will be analyzed to assess potential adverse impacts on paleontological resources. Mitigation may include prohibition, avoidance, or onsite monitoring, based on the assessment. OHV use in the area will be limited to designated roads and trails. Visitor interpretation and education facilities will be minimal, using offsite or nearby signs or kiosks. A management plan will be written for any development and to identify long-term goals for management. The area for designation includes BLM-administered lands only on the south side of Alcova Reservoir (5,963 total acres, of which 5,282 are BLM-administered surface). Refer to Appendix W for legal descriptions.
7017	SD:3	No similar action.	All public lands will be retained. Parcels that are presently private or state land will be explored for acquisition of lands and interests in lands using the following priority levels. Refer to Appendix W for legal descriptions. High Priority (to maintain public access to USBR recreation area and acquire significant resources). Moderate Priority (to acquire significant resources and access routes). Low Priority (to enhance opportunities for research, interpretation, and management and/or reduce in holdings).	All public lands will be retained. Parcels that are presently private or state land will be explored for acquisition of lands and interests in lands using the following priority levels. Refer to Appendix W for legal descriptions. High Priority (to maintain public access to USBR recreation area and acquire significant resources). Moderate Priority (to acquire significant resources and access routes). Low Priority (to enhance opportunities for research, interpretation, and management and/or reduce in holdings).	All public lands will be retained. No additional lands will be sought to add to the present public land-ownership pattern.	Same as Alternative C.
7018	SD:3	A withdrawal on the Alcova Fossil Area will be pursued on 1,110 acres. The withdrawal will segregate from operation of the public land laws, including the mining laws, but not mineral leasing laws.	A withdrawal on the Alcova Fossil Area will be pursued on 7,073 acres. The withdrawal will segregate from operation of the public land laws, including the mining laws, but not mineral leasing laws.	A withdrawal on the Alcova Fossil Area will be pursued on 5,809 acres. The withdrawal will segregate from operation of the public land laws, including the mining laws, but not mineral leasing laws.	No withdrawal on the Alcova Fossil Area will be pursued.	Same as Alternative C.

Table 2-3. Detailed Table of Alternatives (Continued)

7000 Special Designations (SD) – Bates Hole (Proposed SMA)						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
Goal **GOAL SD:4** Manage the Bates Hole SMA to protect highly erosive soils, fragile watersheds, and important and crucial wildlife habitat; conserve and (or) improve special status species habitat and maintain unfragmented vegetative communities. **OBJECTIVES –** None identified**.**						
Management Actions Common to All Alternatives						
7019	SD:4	Those portions of the Bates Hole SMA within the Jackson Canyon ACEC and Muddy Mountain EEA would be managed under the decisions for those areas.				
7020	SD:4	Those portions of the Bates Hole SMA within the North Platte River ACEC/SRMA and Alcova Fossil ACEC (if selected) would be managed under the decisions for those areas.				
7021	SD:4	Management actions to conserve and (or) improve greater sage-grouse habitats are described under Alternative B in the Special Status Species section.				
Note: Management actions needed to meet the goals for the Bates Hole SMA are identified below; however, other resource values not identified in the goals would be managed in accordance with the individual RMP decisions for that resource.						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
7022	SD:4	Resource management in this area would continue to focus on managing the principal resource values in the area. These are vegetation, wildlife, sensitive soils, and fragile watersheds.	The Bates Hole SMA would be established on approximately 375,221 acres, of which 158,023 are BLM surface. This SMA is defined by two State of Wyoming 5th-level watersheds: Bates Creek (HUC10180000702) and North Platte River-Bolton Creek (HUC 10180000701). Due to the mixed land ownership, the area would be managed in cooperation with adjacent landowners.	Same as Alternative B.	The Bates Hole SMA would not be established.	Same as Alternative B.
7023	SD:4	The BLM will pursue acquisition of lands and interest in lands in the Bolton Creek Drainage and Bates Creek areas.	Same as Alternative A.	Same as Alternative A.	The BLM will not pursue acquisition of lands and interest in lands in the Bolton Creek Drainage and Bates Creek areas.	Same as Alternative A.

Table 2-3. Detailed Table of Alternatives (Continued)

7000 Special Designations (SD) – Bates Hole (Proposed SMA)						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
7024	SD:4	To protect the principal resource values in the area, restrictions on development would continue to be managed in the same manner as the rest of the planning area. Big Game Crucial Winter Range: NSO or disruptive activities from 11-15 through 4-30 (TLS) in crucial winter range. The restriction does not apply to maintenance of existing facilities. Sage-grouse Habitats: Avoid surface disturbance or occupancy within ¼ mile of the perimeter of occupied sage-grouse leks (CSU). Avoid human activity between 8 p.m. and 8 a.m. from March 1 to May 15 (TLS) within ¼ mile of the perimeter of occupied sage-grouse leks. Avoid surface-disturbing and disruptive activities in suitable sage-grouse nesting and early brood-rearing habitats within 2 miles of an occupied lek or in identified sage-grouse nesting and early brood-rearing habitats outside the 2-mile buffer from March 15 to July 15 (TLS). Avoid surface-disturbing and disruptive activities in sage-grouse winter habitats from November 15 to March 14 (TLS). Sensitive Soil and Fragile Watersheds: Surface-disturbing activities are prohibited from 11-30 through 6-1 (TLS) on Muddy Mountain. Without written permission, surface-disturbing activities are prohibited on slopes of more than 25 percent. Surface-disturbing activities are prohibited within ¼ mile of the North Platte River and within 500 feet of live streams, lakes, reservoirs, canals, associate riparian habitats, water wells, springs, or artesian and flowing wells. Special Designations: The Jackson Canyon ACEC and Muddy Mountain EEA areas would continue to be managed as described in their respective activity plans.	Surface-disturbing activities and disruptive activities would be subject to a CSU stipulation, restricting or prohibiting surface occupancy unless the proponent and surface management agency arrive at an acceptable plan for mitigation for impacts. To meet watershed management goals, the Bates Hole SMA would be intensively managed as described in Appendix U – Intensive Management.	Same as Alternative B.	To protect the principal resource values in the area, restrictions on development would be managed the same as the rest of the planning area. Big Game Crucial Winter Range:No surface-disturbing and disruptive activities are allowed from November 15 through April 30 (TLS) on all crucial big game winter ranges. The authorized officer can grant exceptions. Sage-grouse Habitats: Same as Alternative A. Sensitive Soil and Fragile Watersheds: The TLS restricting surface-disturbing activities from 11-30 through 6-1 (TLS) on Muddy Mountain will be removed. Without written permission, surface-disturbing activities are prohibited on slopes of more than 25 percent. The area within ¼ mile of the North Platte River would be managed as described in the Special Designations – North Platte River ACEC, Alternative D (within the SRMA) of this document. Special Designations: The Jackson Canyon ACEC would be managed as described in the decision for its activity plan, except as amended in the Special Designations – Jackson Canyon ACEC, Alternative D, of this document. The Muddy Mountain EEA areas would be managed as described in their respective activity plans.	Same as Alternative B.
7025	SD:4	Placement of ROW would continue to be restricted on Highway 220 from Bessemer Mountain to Alcova. When placement of a major ROW facility within a designated corridor is not possible, and for smaller ROW and other linear facilities, placement would continue to be adjacent to existing facilities or disturbances. Cross-country placement of ROW and other linear facilities would continue to be allowed only when placement in a designated corridor or adjacent to an existing facility is not practical or feasible.	No new corridor designations will be made in Bates Hole. When placement of a major ROW facility within a designated corridor is not possible, and for smaller ROW and other linear facilities, placement will be adjacent to existing facilities or disturbances. Cross-country placement of ROW and other linear facilities will be allowed only when placement in a designated corridor or adjacent to an existing facility is not practical or feasible. The extent of all surface disturbances would be minimized.	Same as Alternative B.	The restriction on the placement of ROWs will be removed. All future ROWs in the area would be evaluated on a case-by-case basis.	Same as Alternative B.

Table 2-3. Detailed Table of Alternatives (Continued)

7000 Special Designations (SD) – Black-tailed Prairie Dog (Proposed ACEC)						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
Goal **GOAL SD:5** Manage for the long term, self-sustaining persistence of the black-tailed prairie dog through the protection of prairie dog complexes and their habitats in the planning area. **OBJECTIVES –** None identified**.**						
Management Actions Common to All Alternatives No Management Actions Common to All Alternatives identified.						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
7026	SD:5	There are no special designations within the proposed ACEC. The area would continue to be managed for multiple uses.	The Black-tailed Prairie Dog ACEC would be designated for the protection of black-tailed prairie dog habitats. (22,937 total acres, of which 3,103 acres, are BLM surface). The ACEC would remain open to oil and gas leasing, but would be closed to geophysical exploration conducted outside of the rights granted by the oil and gas lease. Geophysical exploration conducted under the rights granted by the lease would be allowed. Future development on new oil and gas leases would be allowed for one well pad per 160 acres of federal mineral estate. For those ¼ sections where the federal mineral estate is less than 160 acres, one well pad would be allowed. Linear facilities would be routed around the ACEC (CSU), where possible. Aboveground facilities located within ¼ mile of the ACEC would be equipped with anti-raptor perching devices. Artificial nest structures would not be allowed in the ACEC. Natural fire regime would be introduced in the ACEC.	Same as Alternative B.	The Black-tailed Prairie Dog area would not be designated an ACEC. The area would be managed for multiple uses.	Same as Alternative D.

Table 2-3. Detailed Table of Alternatives (Continued)

7000 Special Designations (SD) – Cedar Ridge Traditional Cultural Property (TCP) (Proposed ACEC or SMA)

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Goal **GOAL SD:6** Protect sensitive and significant values at Cedar Ridge. **OBJECTIVES –** None identified**.**						
Management Actions Common to All Alternatives. No Management Actions Common to All Alternatives identified.						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
7027	SD:6	No special designations for the Cedar Ridge TCP exist. Sensitive and significant values at Cedar Ridge are protected on a case-by-case basis.	Designate the Cedar Ridge TCP and periphery area as an ACEC (21,742 total acres, of which 14,065 are BLM surface). Activities listed in Intensive Management, Appendix U, would be applied in these areas.	Establish the Cedar Ridge SMA (19,055 total acres, of which 12,481 are BLM surface). Activities listed in Intensive Management, Appendix U, would be applied in these areas.	Cedar Ridge would not be designated as an ACEC or established as an SMA. Cultural resources on Cedar Ridge would be managed in accordance with management actions record numbers 7028 through 7033 listed below.	Same as Alternative D.
7028	SD:6	No similar action.	NSO or use would be allowed in the TCP. Maintenance of existing range improvements will be allowed, but no additional range improvements would be allowed in the ACEC.	Same as Alternative B.	Surface-disturbing activities in the TCP would be subject to a CSU stipulation, restricting or prohibiting surface occupancy unless the proponent and surface management agency arrive at an acceptable plan for mitigation of impacts.	NSO or use would be allowed in the TCP. Maintenance of existing range improvements will be allowed. No additional range improvements would be allowed.
7029	SD:6	No similar action.	The Cedar Ridge periphery area is defined as the 3-mile viewshed to the south and Badwater Road to the north. Surface-disturbing activities in this area would be subject to a CSU stipulation, restricting or prohibiting surface occupancy unless the proponent and surface management agency arrive at an acceptable plan for mitigation of impacts. To minimize surface-disturbing activities, oil and gas exploration and development will use directional drilling techniques and well twinning wherever practicable in the periphery area.	Same as Alternative B, except CSU would be applied to a periphery area defined as the 3-mile viewshed as far south as the Arminto/Lost Cabin Road and as far north as Badwater Road.	No CSU would be applied to the Cedar Ridge periphery area.	Same as Alternative C, except the periphery area is defined as the viewshed as far south as the Arminto/Lost Cabin Road and as far north as Badwater Road. Surface-disturbing activities will be minimized by using techniques such as directional drilling and well twinning wherever practicable in the periphery area.
7030	SD:6	The area would continue to be open to disposal of mineral materials.	Development of mineral materials will not be allowed within the TCP. Existing mineral material permits would be allowed to expire without renewal or expansion. Disturbed areas would be rehabilitated to achieve visual resource and vegetative standards. Development of mineral materials in the periphery area would be restricted to five acres or less, allowing expansion of sites or contiguous development of mineral materials only after rehabilitation of the initial location has been initiated.	Same as Alternative B.	Same as Alternative A.	Same as Alternative B.
7031	SD:6	No similar action	BLM will pursue acquisition of lands and interest in lands in the Cedar Ridge area.	Same as Alternative B.	Same as Alternative B.	Same as Alternative B.

Table 2-3. Detailed Table of Alternatives (Continued)

7000 Special Designations (SD) – Cedar Ridge Traditional Cultural Property (TCP) (Proposed ACEC or SMA)						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
7032	SD:6	No similar action.	Within the TCP and periphery area, the current level of livestock use will be maintained or reduced.	Within the TCP, the current level of livestock use will be maintained or reduced.	Maintain, but do not reduce, the current level of livestock use in either the TCP or the periphery area.	Manage levels of livestock use to meet TCP objectives.
7033	SD:6	No similar action.	A withdrawal on Cedar Ridge will be pursued for the TCP (19,637 acres of federal mineral estate) and a buffer zone. The withdrawal will segregate from operation of the public land laws, including the mining laws.	A withdrawal on Cedar Ridge will be pursued for the TCP only (4,058 acres of federal mineral estate). The withdrawal will segregate from operation of the public land laws, including the mining laws.	No withdrawal will be pursued on Cedar Ridge.	Same as Alternative C.

Table 2-3. Detailed Table of Alternatives (Continued)

7000 Special Designations (SD) – North Platte River (Proposed ACEC, SMA, or SRMA)

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Goals and Objectives						
GOAL SD:7 Protect the natural resources, fisheries, wildlife habitats, and cultural values within the North Platte River corridor.						
OBJECTIVES -						
SD:7.1 Manage the public lands and mineral estate in a manner that enhances the natural character and preserves wildlife and fisheries habits.						
SD:7.2 Manage activities on public lands and mineral estate in a manner that minimizes surface disturbance.						
SD:7.3 Manage riparian habitats on public lands and mineral estates for PFC and DPC.						
GOAL SD:8 Manage water-based recreation opportunities to provide an array of benefits to the public—including economic, environmental, personal, and social benefits—to protect the relevant values along this river.						
OBJECTIVES -						
SD:8.1 Provide a diverse array of quality water-based recreation opportunities while minimizing user conflicts and promoting public safety.						
SD:8.2 Support and collaborate with local governments and service providers in adjoining communities to produce recreation opportunities for visitors and local residents to achieve health and fitness goals and quality of life benefits.						
SD:8.3 Emphasize and support collaborative public outreach, awareness events, and programs that promote public service and stewardship.						
Management Actions Common to All Alternatives						
7034	SD:7.1	The existing North Platte River protective withdrawal on 3,226 acres would continue. The withdrawal segregates from operation of the public land laws, including the mining laws, but not the mineral leasing laws.				
7035	SD:7.1	The BLM will pursue acquisition of lands and interest in lands in the North Platte River area. Lands acquired by purchase or donation are segregated from operation of the public land laws, including the mining laws.				
7036	SD:7.1	Restoration projects will focus on improving wildlife and fisheries habitats and recreational opportunities.				
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
7037	SD:7.1	Public lands along the North Platte River would continue to be managed as an SRMA (3,561 acres of which 3,561 acres are BLM-administered surface, and 3,552 acres are federal mineral estate).	The North Platte River would be designated as an ACEC. The ACEC would include public lands and mineral estates within ¼ mile either side of the river from the high water mark for the entire length of the Casper Field Office (85,392 acres of which 3,488 acres are BLM-administered surface, and 15,286 acres are federal mineral estate).	A portion of the North Platte River would be designated as an ACEC. The ACEC would include public lands and mineral estates within ¼ mile either side of the river from the high water mark between Pathfinder Dam and the Dave Johnston Power Plant (33,258 acres of which 2,387 acres are BLM-administered surface, and 7,840 acres are federal mineral estate).	A portion of the North Platte River would be established as an SRMA. The SRMA would include public lands and mineral estates within ¼ mile either side of the river from the high water mark between Pathfinder Dam and Robertson Road in Casper (19,499 acres of which 2,238 acres are BLM-administered surface, and 6,054 acres are federal mineral estate).	A portion of the North Platte River would be established as an SRMA. The SRMA would include public lands and mineral estates within ¼ mile either side of the river from the high water mark between Pathfinder Dam and the Natrona/Converse County line (25,842 acres of which 2,250 acres are BLM-administered surface, and 7,059 acres are federal mineral estate).
7038	SD:7.1	The area within ¼ mile of the North Platte River for its entire length in the planning area would continue to be closed to disposal of mineral materials.	The ACEC would be closed to disposal of mineral materials.	Same as Alternative B within the ACEC. Public lands within ¼ mile of the high water mark downstream of the ACEC (east of the Dave Johnston Power Plant) would be open to disposal of mineral materials.	Same as Alternative B within the SRMA. Public lands within ¼ mile of the high water mark and downstream of the SRMA (east of Robertson Road in Casper) would be open to disposal of mineral materials.	The SRMA would be closed to mineral material disposal. Public lands within ¼ mile of the river and downstream of the SRMA (east of Natrona/Converse County Line) would be open to disposal of mineral materials with the following exceptions: (a) public lands adjacent to or within ¼ mile of Guernsey Reservoir, or (b) public lands within Glendo State Park or within ¼ mile of the Glendo State Park boundary would be closed to disposal of mineral materials.

Table 2-3. Detailed Table of Alternatives (Continued)

7000 Special Designations (SD) – North Platte River (Proposed ACEC, SMA, or SRMA)						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
7039	SD:7.1	The area within ¼ mile of the North Platte River would continue to be open to oil and gas leasing and geophysical operations.	The ACEC would be closed to oil and gas leasing and geophysical operations.	Same as Alternative B within the ACEC. Public lands within ¼ mile of the high water mark downstream of the ACEC (east of the Dave Johnston Power Plant) would be open to oil and gas leasing and geophysical operations.	Same as Alternative B within the SRMA. Public lands within ¼ mile of the high water mark and downstream of the SRMA (east of East of Robertson Road in Casper) would be open to oil and gas leasing and geophysical operations.	Same as Alternative A within the SRMA.
7040	SD:7.1	Surface development would continue to be prohibited within ¼ mile of the North Platte River. The ¼-mile restriction would not be waived on the Trappers Route tracts, but it would be waived for recreation facilities.	Same as Alternative A within the ACEC.	Same as Alternative A within the ACEC. Surface development would be allowed on public lands within ¼ mile of the high water mark downstream of the ACEC (east of the Dave Johnston Power Plant) subject to a CSU stipulation.	Same as Alternative A within the SRMA. Surface development would be allowed on public lands within ¼ mile of the high water mark downstream of the SRMA (east of Robertson Road in Casper) subject to a CSU stipulation.	Same as Alternative A within the SRMA. Surface development would be allowed on public lands within ¼ mile of the high water mark downstream of the SRMA (east of the Natrona/Converse County line) subject to a CSU stipulation. However, public lands adjacent to or within ¼-mile of Guernsey Reservoir, or within Glendo State Park or within ¼ mile of the Glendo State Park boundary would be subject to an NSO restriction, except for recreational facilities.
7041	SD:7.1	The area within 1 mile on either side of the river would continue to be an ROW exclusion area.	The ACEC would be an ROW exclusion area.	Same as Alternative B within the ACEC. Public lands within ¼ mile of the high water mark downstream of the ACEC (east of the Dave Johnston Power Plant) would be available for location of ROWs.	Same as Alternative B within the SRMA. Public lands within ¼ mile of the high water mark downstream of the SRMA (east of Robertson Road in Casper) would be available for location of ROWs.	Same as Alternative B within the SRMA. Public lands within ¼ mile of the high water mark downstream of the SRMA (east of the Natrona/Converse County line) would be available for location of ROWs.
7042	SD:7.1	Newly acquired parcels along the North Platte River would continue to be closed to grazing.	Same as Alternative A.	Lands acquired in the ACEC by purchase or donation would be available for livestock grazing, except those lands used as recreational landing sites. Public lands within ¼ mile of the high water mark downstream of the ACEC (east of the Dave Johnston Power Plant) would be available for livestock grazing.	Lands acquired along the entire river by purchase or donation would be available for livestock grazing.	Those lands used as recreational landing sites and lands acquired along the entire river to enhance public access by purchase, donation, or exchange would be closed to livestock grazing.
7043	SD:7.1	Public surface along the river would continue to be available for livestock grazing. Grazing leases may be adjusted for the protection of natural resources, wildlife habitats, and recreational values.	The ACEC would be open to livestock grazing. Grazing leases may be adjusted or terminated for the protection of natural resources, wildlife habitats, and recreational values. Grazing leases would not be renewed for Trapper's Route landing sites.	Same as Alternative B within the ACEC. Public lands within ¼ mile of the high water mark downstream of the ACEC (east of the Dave Johnston Power Plant) would be available for livestock grazing.	Same as Alternative B within the SRMA. Public lands within ¼ mile of the high water mark downstream of the SRMA (east of Robertson Road in Casper) would be available for livestock grazing.	Same as Alternative A.
7044	SD:8.1	Obtain access to the areas identified below. North Platte River	Obtain access to the areas identified below, where demand and public use are high. North Platte River upstream of Casper	Obtain access to the areas identified below. North Platte River upstream of Casper	Obtain access to the areas identified below. North Platte River (Pathfinder to Casper)	Negotiate easements where needed, to meet program needs. These needs would be identified on a case-by-case basis.

Table 2-3. Detailed Table of Alternatives (Continued)

7000 Special Designations (SD) – Salt Creek (Proposed SMA)

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Goal **GOAL SD:9** Manage the Salt Creek SMA to facilitate oil and gas exploration and development. **OBJECTIVES –** None identified**.**						
Management Actions Common to All Alternatives No Management Actions Common to All Alternatives identified.						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
7045	SD:9	The proposed Salt Creek SMA lies within the Salt Creek Hazardous ACEC. Activities within the ACEC are managed in accordance with the decision for the ACEC.	The Salt Creek SMA would not be established to facilitate oil and gas development. The area would be managed in accordance with the RMP revision decisions for that resource or use.	The Salt Creek SMA would be established on areas determined to have a high development potential as defined in the Casper Field Office RFD Scenario for Oil and Gas Development (23,911 acres, of which 19,325 are federal surface). Oil and gas development would be a priority in the area with minimum restrictions. New oil and gas leases in this area would be issued with standard stipulations only. Development would comply with nondiscretionary laws like the ESA, the NHPA, etc., but discretionary timing stipulations protecting sage-grouse nesting habitat, raptor nesting habitat, and crucial winter range would not be considered.	The Salt Creek SMA would be established to include Salt Creek, South Salt Creek, West Salt Creek, Smoky Gap, East Teapot, North Sage Spring Creek, and Sage Spring Creek fields (90,931 acres, of which 35,616 are federal surface). The area would be managed primarily for oil and gas development with minimum restrictions.	Same as Alternative C.

Table 2-3. Detailed Table of Alternatives (Continued)

7000 Special Designations (SD) – Sand Hills (Proposed SMA)

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)

Goal

GOAL SD:10 Manage the Sand Hills SMA to maintain the integrity of soils and vegetation and to protect highly erosive soils and watershed values.

OBJECTIVES – None identified.

Management Actions Common to All Alternatives

No Management Actions Common to All Alternatives identified.

Note: Management actions needed to meet the goal for the Sand Hills SMA are identified below; however, other resource values not identified in the goal would be managed in accordance with the individual RMP decisions for that resource.

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
7046	SD:10	The area contains no designated SMAs. Resource management in this area would continue to focus on managing the principal resource values in the area (i.e., soil, water, and vegetation on fragile sand dunes).	The Sand Hills SMA would be established on 17,633 acres, all of which is BLM surface.	Same as Alternative B.	The Sand Hills management area would not be established.	Same as Alternative B.
7047	SD:10	The area would continue to be open to oil and gas leasing and geophysical exploration.	The area would be closed to oil and gas leasing and geophysical exploration would not be allowed.	Same as Alternative B.	The area would be open to oil and gas leasing and geophysical exploration.	Same as Alternative B.
7048	SD:10	The area would continue to be open to operation of the public land laws, including the mining laws.	The area will be withdrawn. The withdrawal would segregate from operation of the public lands laws, including the mining laws.	Same as Alternative B.	The area would be open to operation of the public land laws, including the mining laws.	Same as Alternative B.
7049	SD:10	The area would continue to be open to the disposal of mineral materials.	The area will be closed to disposal of mineral materials.	Same as Alternative B.	The area would be open to the disposal of mineral materials.	Same as Alternative B.
7050	SD:10	Parcels for disposal by exchange for public purpose needs have been identified on lands within RMU 6, Sand Hills (formerly Casper Sand Dunes). These parcels may be disposed of by sale in response to public request if the sale clearly would be in the public's interest and conforms to management objectives for the area.	Time will be allowed for land-tenure adjustments (consistent with management objectives for the area).	Same as Alternative B.	Land acquisition would be pursued on a case-by-case basis.	Same as Alternative B.
7051	SD:10	No designated corridors within the proposed Sand Hills SMA exist. When placement of a major facility within a designated corridor is not possible, and for smaller ROW facilities, placement will be adjacent to existing facilities or disturbances. Cross-country ROW placement will be allowed only when placement in a designated corridor or adjacent to an existing facility is not practical or feasible.	No new corridor designations would be made. The area would be an ROW exclusion area.	Same as Alternative B.	Same as Alternative A.	Same as Alternative B.
7052	SD:10	BLM will pursue acquisition of lands and interest in lands in the Sand Hills area.	Same as Alternative A.	Same as Alternative A.	BLM will not pursue acquisition of lands and interest in lands in the Sand Hills area.	Same as Alternative A.

Table 2-3. Detailed Table of Alternatives (Continued)

7000 Special Designations (SD) – Sand Hills (Proposed SMA)						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
7053	SD:10	A watershed plan would be developed for the area in coordination with wildlife and range resources. The plan would clarify any special mitigation required to reduce impacts associated with surface-disturbing activities.	All surface-disturbing activities would be subject to a CSU stipulation, minimizing surface disturbance to meet management objectives.	Same as Alternative B.	A watershed plan would not be developed for the area.	Same as Alternative B.
7054	SD:10	No legal public access is available; access is gained through landowner permission only. Access is aquired only through a cooperative landowner agreement, should public demand warrant it.	Provide access and limit use to nonmotorized.	Provide road access.	Same as Alternative A.	Pursue obtaining legal public access and limit use to nonmotorized.
7055	SD:10	Obtain access to areas identified below. Sand Hills (formerly Casper Sand Dunes)	No similar action.	Obtain access to the areas identified below. Sand Hills	Obtain access to the areas identified below. (Pathfinder to Casper). Sand Hills	Negotiate easements, where needed, to meet program needs. These needs would be identified on a case-by-case basis.

7000 Special Designations (SD) – South Bighorns/Red Wall (Proposed ACEC or SMA)						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
Goal and Objectives **GOAL SD:11** Manage the South Bighorns/Red Wall SMA to protect and enhance crucial wildlife habitat; protect and enhance unique vegetative communities; maintain unfragmented habitats; preserve and protect cultural and scenic values; and maintain the undeveloped, open character while providing for a semi-primitive recreational experience. **OBJECTIVES -** **SD:11.1** Maintain intact crucial wildlife habitats, unique vegetative communities, unfragmented habitats, significant cultural sites, and open space. **SD:11.2** Maintain current acres of curl-leaf mountain mahogany over a span of 15 years.						
Management Actions Common to All Alternatives						
7056	SD:11.1	Those portions of the South Bighorns/Red Wall ACEC/SMA within the Cedar Ridge ACEC/SMA would be managed in accordance with the decisions for Cedar Ridge.				
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
7057	SD:11.1 SD:11.2	The area contains no designated ACECs or SMAs. Resource management in this area would continue to focus on managing the principal resource values in the area. These are (i.e., vegetation, recreation, and mineral development).	The South Bighorns/Red Wall ACEC would be designated on approximately 262,901 acres, of which 146,812 acres are public surface and 216,460 acres are federal mineral estate.	The South Bighorns/Red Wall SMA would be established on approximately 369,325 acres, of which 206,155 acres are public surface and 309,854 acres are federal mineral estate.	The South Bighorns/Red Wall Area would not be designated as an ACEC or established as an SMA. The area would be managed for multiple uses.	The South Bighorns/Red Wall SMA would be established on approximately 93,352 acres, of which 55,945 acres are public surface and 75,913 acres are federal mineral estate.
7058	SD:11.1 SD:11.2	The area would continue to be open to mining.	The ACEC would be withdrawn. The withdrawal would segregate from the operation of the public land laws, including the mining laws.	The SMA would be withdrawn. The withdrawal would segregate from the operation of the public land laws, including the mining laws.	No withdrawal would be pursued. These lands would remain open to mining.	The area would be withdrawn. The withdrawal would segregate from the operation of the public land laws, including the mining laws.

Table 2-3. Detailed Table of Alternatives (Continued)

7000 Special Designations (SD) – South Bighorns/Red Wall (Proposed ACEC or SMA)						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
7059	SD:11.1	Approximately 20,179 acres, of which 12,539 acres are public surface and 20,179 acres are federal mineral estate, would continue to be closed to oil and gas leasing. The area would continue to be open to geophysical exploration with operations severely limited by NSO restrictions.	The ACEC would be closed to new oil and gas leasing and geophysical operations on public surface. Activities on existing oil and gas leases would be managed intensively to meet the objectives of the ACEC (see Appendix U – Intensive Management). To minimize surface-disturbing activities, oil and gas exploration and development would use directional drilling techniques and well twinning whenever practicable.	The SMA would be closed to new oil and gas leasing and geophysical operations on public surface. Activities on existing leases would be managed intensively to meet the objectives of the SMA (see Appendix U – Intensive Management). To minimize surface-disturbing activities, oil and gas exploration and development would use directional drilling techniques and well twinning whenever practicable.	The area would be open to oil and gas leasing and geophysical operations on public lands.	Same as Alternative C.
7060	SD:11.1	The area would continue to be open to disposal of mineral materials.	The ACEC would be closed to disposal of mineral materials. Existing rights would be allowed to expire without renewal or expansion. Disturbed areas would be rehabilitated to achieve visual resource and vegetative standards.	That portion of the viewshed of the South Bighorns/Red Wall National Back Country Byway and county roads within the SMA would restrict surface disturbance associated with the disposal of mineral materials to 5 acres or less, allowing for expansion of sites or contiguous disturbance only after rehabilitation of the initial location has been started.	The area would be open to disposal of mineral materials.	Same as Alternative B, except "ACEC" is changed to "SMA."
7061	SD:11.1	The BLM will pursue acquisition of lands and interest in lands in the South Bighorns/Red Wall area.	Same as Alternative A.	Same as Alternative A.	The BLM will not pursue acquisition of lands and interest in lands in the South Bighorns/Red Wall area.	Same as Alternative A.
7062	SD:11.1	There are no designated corridors within the area; however, a small portion of the Lost Cabin-Arminto Road corridor overlaps the southwestern extent of the area.	There are no designated corridors and no corridors will be designated. No ROW will be allowed under this alternative; the area would be an ROW exclusion area.	The existing Lost Cabin-Arminto Road designated ROW corridor would be continued, but no new corridors would be designated. Any ROW in this area would be required to be located within the Lost Cabin-Arminto Corridor; the remainder of the area would be an ROW exclusion area.	The Lost Cabin-Arminto Road corridor designation would be removed. Restriction on the placement of ROWs would be removed. All future ROWs in the area would be evaluated on a case-by-case basis.	Same as Alternative B.
7063	SD:11.1 SD:11.2	The NSO restriction within ½ mile of the Red Wall/Gray Wall complex would be continued. (Approximately 35,212 acres, of which 20,820 acres are public surface and 27,629 acres are federal mineral estate.)	Same as Alternative A.	The Red Wall/Gray Wall complex would be managed with CSU stipulation restricting or prohibiting surface occupancy, unless the proponent and surface management agency arrive at an acceptable plan for mitigation of impacts.	The NSO restriction within ½ mile of the Red Wall/Gray Wall complex would be removed.	The Red Wall/Gray Wall complex is located entirely within the South Bighorns/Red Wall SMA and is closed to new oil and gas leasing and geophysical operations on public surface. Activities on existing leases would be intensively managed to meet the objectives of the SMA (see Appendix U – Intensive Management). To minimize surface-disturbing activities, oil and gas exploration and development would use directional drilling techniques and well twinning whenever practicable.
7064	SD:11.1 SD:11.2	Non mineral-related surface-disturbing activities within ½ mile of the Red Wall/Gray Wall complex would continue to be subject to an NSO stipulation (NSO).	To meet the objectives of the area, non-mineral-related surface-disturbing activities and disruptive activities would be subject to a CSU stipulation restricting or prohibiting surface occupancy, unless the proponent and surface management agency arrive at an acceptable plan for mitigation of impacts.	Same as Alternative B.	The NSO restriction within ½ mile of the Red Wall/Gray Wall complex would be removed.	Nonmineral-related surface-disturbing activities within ½ mile of the Red Wall/Gray Wall complex would be subject to an NSO stipulation. To meet the objectives of the area, those areas outside the Red Wall/Gray Wall complex would be subject to a CSU stipulation restricting or prohibiting surface occupancy, unless the proponent and surface management agency arrive at an acceptable plan for mitigation of impacts.

Table 2-3. Detailed Table of Alternatives (Continued)

7000 Special Designations (SD) – South Bighorns/Red Wall (Proposed ACEC or SMA)						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
7065	SD:11.1	Cultural resources inventories are conducted in compliance with Section 106.	Conduct systematic block cultural resources inventories of the South Bighorns/Red Wall area. Acquire additional lands to block up and buffer sensitive resources, such as concentrations of sites eligible for nomination to the NRHP.	Conduct Class III block cultural inventories in high-site density areas. Acquire additional lands, when offered, to block uplands around sensitive resource concentrations.	Same as Alternative A.	Same as Alternative A.
7066	SD:11.2	Obtain access to areas identified below. Red Wall South Bighorns	Obtain access to the areas identified below, where public use is high. Red Wall	Obtain access to the areas identified below. Red Wall South Bighorns	Obtain access to the areas identified below. Red Wall South Bighorns	Negotiate easements, where needed, to meet program needs. These needs would be identified on a case-by-case basis.

7000 Special Designations (SD) – Wind River Basin (Proposed SMA)						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
Goal **GOAL SD:12** Manage the Wind River Basin SMA to facilitate oil and gas exploration and development. **OBJECTIVES –** None identified.						
Management Actions Common to All Alternatives No management Actions Common to All Alternatives identified.						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
7067	SD:12	There are no special designations for the Wind River Basin.	The Wind River Basin SMA would not be established to facilitate oil and gas development. The area would be managed according to the RMP revision decisions for that resource or use.	The Wind River Basin SMA would be established on portions of the Wind River Basin having moderate-to-high oil and gas development potential (281,037 acres, of which 100,401 are federal surface). Oil and gas development would be a priority in the area with minimum restrictions. New oil and gas leases in this area would be issued with standard stipulations only. Development would comply with nondiscretionary laws such as the like the ESA, the NHPA, etc., but the discretionary timing stipulations protecting sage-grouse nesting habitats, raptor nesting habitats, mountain plover nests, and crucial winter range would not be applied.	Same as Alternative C, except the SMA would be established on the entire Wind River Basin geologic province (539,911 acres, of which 213,238 are federal surface).	Same as Alternative C, except the SMA would be established only on portions of the Wind River Basin with high and moderate oil and gas development potential (54,575 acres, of which 18,277 are federal surface).

Table 2-3. Detailed Table of Alternatives (Continued)

7000 Special Designations (SD) – National Back Country Byways						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
Goal and Objective **GOAL SD:13** Manage National Back Country Byways to enhance opportunities for the American public to see and enjoy the unique scenic and historic opportunities on public lands. **OBJECTIVE -** **SD:13.1** Showcase the BLM's multiple-use management through effective interpretation.						
Management Actions Common to All Alternatives						
7068	SD:13.1	The existing South Bighorns/Red Wall National Back Country Byway designation would continue. Since the Seminoe/Alcova National Back Country Byway designation would continue in the Rawlins planning area, that portion of the byway within the planning area would continue to be cooperatively managed with the Rawlins Field Office.				
Management Actions by Alternative						
7069	SD:13.1	No similar action.	Install interpretive signs and kiosks on the National Back Country Byways (add cultural resource interpretation to existing kiosks; install one at each end of Bighorn Mountain Road where it intersects Buffalo Creek Road. Signs could be placed near EK Creek, Cottonwood Creek, Buffalo Creek and Grave Spring campgrounds, above Hackett Creek, and at Alkali Creek.	Install interpretive signs on the National Back Country Byways. Signs could be placed near EK Creek, Cottonwood Creek, Buffalo Creek, and Grave Spring campgrounds, above Hackett Creek, and at Alkali Creek.	Same as Alternative C.	Develop and implement interpretive signs on the National Back Country Byways. In addition, develop and implement a general signing program for the Casper Field Office.

Table 2-3. Detailed Table of Alternatives (Continued)

7000 Special Designations (SD) – National Historic Trails (NHTs) and Other Historic Trails

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Goals and Objectives						
GOAL SD:14 Manage historic trails for long-term heritage and educational values and to enhance the public experience.						
OBJECTIVES -						
SD:14.1 Sites associated with historic trails will be interpreted and developed as needed.						
SD:14.2 Maintain compatible recreational use with historic trail values.						
GOAL SD:15 Enhance public experience through interpretive facilities and support of heritage tourism.						
GOAL SD:16 Reduce imminent threats from natural or human-caused deterioration or potential conflicts with other resource uses.						
OBJECTIVES -						
SD:16.1 Maintain an inventory and evaluate trail segments for contributing or non-contributing status and include this information in a revised trails management plan.						
SD:16.2 Monitor the condition of contributing trail segments and associated sites every 2 years or as appropriate.						
SD:16.3 Maintain setting for those contributing trail segments where setting is an aspect of integrity by utilizing viewshed management tools.						
SD:16.4 Develop activity plans for contributing trails segments and associated sites identified as high risk for adverse impacts.						
SD:16.5 Maximize partnership and cooperative management opportunities (e.g., cooperate with private landowners to install trail markers, provide public access, etc).						
Management Actions Common to All Alternatives						
7070	SD:14.1 SD:14.2	Site TIR-8 Glade Draw Segment: The existing OHV closure will be maintained. Public access will be maintained to the site. Future management actions include placing an historic marker and interpretive sign at the site. The site will be nominated to the National Register of Historic Places.				
7071	SD:14.1 SD:16	Specified trail segments included in the Oregon/Mormon Pioneer National Historic Trails Management Plan (1986 USDI-Bureau of Land Management) would continue to be managed in accordance with this plan.				
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
Management Actions Applicable to All Historic Trails						
7072	SD:14.1 SD:16	NSO within ¼ mile or visual horizon, whichever is closer (1985 RMP, Decision M1 Surface Disturbance Stipulations; IM-WY-90-564). No similar action.	NSO within a ¼ mile or the visual horizon, whichever is closer; CSU from ¼ mile to 5-mile foreground/middle ground viewshed. The foreground/middle ground of NHTs will be managed as Class II until inventories are completed. Trail segments contributing to the overall eligibility and that have integrity of setting will be managed as VRM Class II. Where integrity of setting is lacking, the foreground/middle ground of NHTs will be managed as Class III.	CSU within a ¼ mile or the visual horizon, whichever is closer; CSU to 3-mile foreground viewshed. The foreground/middle ground of NHTs will be managed as Class II until inventories are completed. Trail segments contributing to the overall eligibility and that have integrity of setting will be managed asVRM Class II. Where integrity of setting is lacking, the foreground/middleground of NHT will be managed as Class III.	Same as Alternative A, except CSU within a ¼ mile or the visual horizon, whichever is closer. The foreground/middle ground of NHTs will be managed as Class II until inventories are completed. Trail segments contributing to the overall eligibility and that have integrity of setting will be managed as VRM Class II. Where integrity of setting is lacking, the foreground/middle ground of NHTs will be managed as Class III.	**A. NHTs and other Historic Trails Where Setting Does Not Contribute to NRHP Eligibility.** 1. Existing physical features and associated sites would be protected from physical impacts. There would be no surface disturbance on trail traces. See Map 64. 2. CSU within ¼ mile or the visual horizon, whichever is closer to ensure that surface-disturbing activities avoid trail remains and the lands immediately surrounding them. Map 64 shows the protective zones. 3. ROW crossings at previously disturbed areas at right angles. 4. The setting associated with these historic trails would be managed in accordance with objectives for the VRM Class established for the areas. See Map 64.

Table 2-3. Detailed Table of Alternatives (Continued)

7000 Special Designations (SD) – National Historic Trails (NHTs) and Other Historic Trails						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
						B. Where Historic Setting Contributes to NRHP Eligibility 1. Existing physical features and associated sites would be managed so that the trail trace and associated sites would be protected from physical impacts. 2. CSU would extend to the viewshed foreground (out to a maximum of 3 miles) or the visual horizon, whichever is closer to ensure that surface-disturbing activities avoid trail remains and the lands immediately surrounding them. Map 64 shows the protective zones. Management guidelines are summarized below: ROW crossings at previously disturbed areas at right angles Mineral leasing would continue with a CSU stipulation Fences and range improvements would be permitted if impacts mitigated. 3. The historic setting associated with these trails would be managed to maintain the existing character of the landscape. Accordingly, the viewshed foreground (out to a maximum of 3 miles) would be managed as follows: VRM Class II Mineral leasing would continue with CSU stipulation. 4. NHTs will be managed as VRM Class II until inventories are completed. Segments not contributing overall eligibility will be managed as Class III.
7073	SD:14.1 SD:16	No similar action.	Locatable minerals within the 3-mile viewshed of historic trails would be withdrawn to locatable entry and operation, including disposal (924,153 acres).	Locatable minerals within ¼ mile of historic trails and prominent landforms (to be identified) within the 3-mile viewshed would be withdrawn to locatable entry and operation, including disposal (238,614 acres within ¼ mile and approximately 15,000 acres around prominent landforms for a total of 253,614 acres).	Locatable minerals would not be withdrawn.	Locatable minerals within ¼ mile of existing historic trails segments and prominent landforms (to be identified) associated with the trail would be withdrawn to locatable entry and operation, including disposal (238,614 acres within ¼ mile and approximately 15,000 acres around prominent landforms for a total of 253,614 acres).
Oregon Trail						
7074	SD:14.1 SD:14.2 SD:16	No surface development (NSO) will be allowed on the specific sites listed in Appendix W. The BLM will reassess the need to include other sites as they may be identified and to write management plans for sites that are potentially eligible for the NRHP (955 acres). Sites in Appendix W marked with an asterisk have been nominated to the National Register (829 acres).	No surface disturbance (NSO) on the listed trail segments in Appendix W is permitted unless it is to the benefit of the preservation or interpretation of the trail. The BLM will continue to reassess the need to include other sites, as identified.	Same as Alternative B.	Same as Alternative B.	Same as Alternative B.

Table 2-3. Detailed Table of Alternatives (Continued)

7000 Special Designations (SD) – National Historic Trails (NHTs) and Other Historic Trails						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
7075	SD:14.2 SD:16.1	The following four parcels are part of Interagency Agreement No. K910-A3-0013 with the NPS for management of lands adjoining the Fort Laramie National Historic Site. These lands are not suitable for disposal by sale. They remain available for disposal by exchange or for transfer to the NPS. 1. Fort Laramie "A" Segment contains approximately 222 acres. 2. Old Bedlam Segment contains approximately 40 acres. 3. Tract Adjacent to South Boundary (excluding Fort Laramie National Historic Site withdrawal) contains approximately 148 acres. 4. Tract South of Old Bedlam contains approximately 120 acres (for a total of 530 acres). (Refer to Appendix W).	Continue to renew the existing MOU with the NPS at Fort Laramie. Acquire lands within the area described within the MOU. Pursue transfers, land or sales exchanges, conservation easements, and other management agreements with other governmental entities with the intention of preserving the recreation and historic values of the 13-mile stretch between Fort Laramie and Guernsey (to be managed as a recreational corridor). Manage pristine segments as VRM Class II; non-pristine segments as Class III.	Continue to renew the existing MOU with the NPS at Fort Laramie.	Let the MOU between the Casper Field Office and Fort Laramie National Historic Site expire.	Cooperatively manage per Interagency Agreement No. K910-A3-0013 with the NPS trail segments included in the agreement (see Appendix W). Pursue transfers, land exchanges or sales exchanges, conservation easements, and other management agreements with other governmental entities with the intention of preserving the recreation and historic values of the 13-mile stretch between Fort Laramie and Guernsey (to be managed as a recreational corridor). Manage pristine segments as VRM Class II; non-pristine segments as Class III.
7076	SD:16.3	The BLM will pursue acquisition of lands and an interest in lands in the Ryan Hill/Alkali Slough, Avenue of Rocks, and Willow Springs areas.	The BLM will pursue acquisition of lands and an interest in lands in the Ryan Hill/Alkali Slough, Avenue of Rocks, and Willow Springs areas, as well as historic trail segments along the 13-mile stretch between Fort Laramie and Guernsey and west of Douglas.	Same as Alternative B.	The BLM will not pursue acquisition of lands and an interest in lands in the Ryan Hill/Alkali Slough, Avenue of Rocks, and Willow Springs areas, nor will the BLM pursue acquisition of historic trail segments along the 13-mile stretch between Fort Laramie and Guernsey and west of Douglas.	Acquisition of lands and interests in lands along NHTs through exchange, purchase, or donation would be pursued on a case-by-case basis.
7077		Obtain access to the areas identified below. Ryan Hill/Alkali Slough	No similar action.	Obtain access to the areas identified below. Ryan Hill/Alkali Slough	Obtain access to the areas identified below. (Pathfinder to Casper). Ryan Hill/Alkali Slough	Negotiate easements, where needed, to meet program needs. These needs would be identified on a case-by-case basis.
Bozeman Trail						
7078	SD:14.1	No surface development will be permitted on selected parcels along the Bozeman Trail in Converse County (1,030 acres). Refer to Appendix W for legal locations. Additional parcels or segments will be added as inventory and evaluation disclose suitable trail segments.	Same as Alternative A, except that NSO would be allowed on the additional sites identified in Appendix W, Table 4, Alternative B.	Same as Alternative A, except that NSO would be allowed on the additional sites identified in Appendix W, Table 4, Alternative C.	Same as Alternative A, except that NSO would be allowed on the additional sites identified in Appendix W, Table 4, Alternative D.	Same as Alternative D.

Table 2-3. Detailed Table of Alternatives (Continued)

7000 Special Designations (SD) – Wild and Scenic Rivers

Goals and Objectives

GOAL SD:17 Goal – Identify waterway segments suitable for inclusion in the National Wild & Scenic River System

OBJECTIVES: None identified.

Management Actions Common to All Alternatives

No Management Actions Common to All Alternatives identified.

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
7079	SD:17	Manage the six eligible waterway segments to protect the free-flowing, outstandingly remarkable values and tentative classification. Do not complete suitability review. Conduct a case-by-case review of proposed actions in eligible waterway segments and apply protective management, subject to valid existing rights. Eligible waterways include the following: • North Platte River • Badwater Creek • EK Creek • Deer Creek • Buffalo Creek (upper) • Buffalo Creek (lower).	Recommend all six eligible waterways as suitable for inclusion in the National Wild and Scenic Rivers system.	Recommend none of the six eligible waterways as suitable for inclusion in the National Wild and Scenic River system.	Same as Alternative C.	Same as Alternative C.

8000 Socioeconomic Resources (SR) – Goals and Objectives

Goals and Objectives

GOAL SR:1 Provide opportunities to develop national energy resources on BLM-administered lands within the planning area.

GOAL SR:2 Provide opportunities to develop resources other than those that are energy-related (e.g., grazing, recreation, wildlife, fisheries, tourism, and others) on BLM-administered lands within the planning area.

OBJECTIVES: None identified.

GOAL SR:3 Provide opportunities to sustain the cultural, social, and economic viability of local and regional communities by using decision-review processes that include considerations of various potential impacts of BLM decisions, including housing, employment, population, fiscal impacts, social services, cultural character, and municipal utilities.

GOAL SR:4 Protect public health and safety and environmental resources through complying with federal and state hazardous materials laws and regulations; maintaining the health of ecosystems though assessment, cleanup, and restoration of contaminated sites; and integrating environmental protection and compliance into all BLM activities.

GOAL SR:5 Reduce potential risks associated with known hazards resulting from human activity, including, but not limited to, health and safety issues and other sensitive resource values.

8000 Socioeconomic Resources (SR) – Management Actions Common to All Alternatives

Record #	Goal/Obj.	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
8001	SR:4 SR:5	Manage hazardous materials in the planning area to reduce risks to visitors and employees, to restore contaminated lands, and to carry out emergency response activities, as per appropriate laws, policies, and regulations.				
8002	SR:4 SR:5	Coordinate with appropriate regulatory agencies to reduce hazards associated with abandoned mines.				
8003	SR:4 SR:5	Educate public of the hazards associated with abandoned mines using publications, signage, web sites, and other educational materials and mediums.				
8004	SR:4 SR:5	Identify and prioritize potential hazards associated with abandoned mines.				

Table 2-3. Detailed Table of Alternatives (Continued)

8000 Socioeconomic Resources (SR) – Social and Economic Conditions						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
8005	SR:1 SR:2 SR:3	The BLM's management actions are integrally connected with socioeconomics and are considered in the NEPA process.	Incorporate national energy needs into Casper Field Office land-use planning, while also considering the socioeconomic goals and objectives identified by the overlapping jurisdictions. Quantify the impacts associated with site-specific and programmatic actions and provide that information to the impacted parties and overlapping jurisdictions for the purpose of having a better common understanding of the impacts of BLM actions with the explicit goal of mitigating impacts through collaborative management, where possible.	Focus on national energy needs in the land-use planning process with regard to the emphasis on mineral development. Quantify the impacts associated with site specific and programmatic actions and provide that information to the impacted parties and overlapping jurisdictions for the purpose of having a better common understanding of the impacts of management actions without any explicit mitigation plans.	Quantify the impacts associated with the alternatives developed for proposed actions without regard to mitigating the socioeconomic impacts.	Same as Alternative B.
8006	SR:1 SR:2 SR:3	The BLM's management actions are integrally connected with socioeconomics and must be considered in the NEPA process.	Quantify the impacts associated with site-specific and programmatic actions and provide that information to the impacted parties and overlapping jurisdictions for the purpose of having a better common understanding of the impacts of management actions. Based on resource constraints, attempt to minimize the conflicts associated with mineral extraction while stressing a balanced approach to diversify and enhance the local economy by stressing, for example, grazing, the development of recreational opportunities, (e.g., fishing, hunting, and wildlife viewing), and renewable energy (e.g., wind power, etc.). Share that information with impacted entities (local, state, and other federal agencies) and work with these agencies to ensure social and economic impacts are addressed and mitigated where possible.	Quantify the impacts associated with site-specific and programmatic actions and provide that information to the impacted parties and overlapping jurisdictions for the purpose of having a better common understanding of the impacts of management actions without any explicit mitigation plans.	Quantify the impacts associated with the alternatives that have been developed for proposed actions without regard to mitigating the socioeconomic impacts or resolving the conflicts that may arise.	Same as Alternative B.
8007	SR:1 SR:2 SR:3	The BLM's management actions are integrally connected with socioeconomics and must be considered in the NEPA process.	Quantify the impacts associated with site-specific and programmatic actions and provide that information to the impacted parties and overlapping jurisdictions for the purpose of having a better common understanding of the impacts of BLM actions with the explicit goal of mitigating impacts through collaborative management where possible.	Quantify the impacts associated with site-specific and programmatic actions and provide that information to the impacted parties and overlapping jurisdictions for the purpose of having a better common understanding of the impacts of management actions without any explicit mitigation plans.	Quantify the impacts associated with site-specific and programmatic actions for the purpose of providing that information to the impacted parties and overlapping jurisdictions.	Same as Alternative B.

Table 2-3. Detailed Table of Alternatives (Continued)

8000 Socioeconomic Resources (SR) – Health and Safety						
Record #	**Goal/Obj.**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E (Preferred Alternative)**
Formerly Used Defense Sites						
8008	SR:4 SR:5	On a case-by-case basis, permit commercial use with notification of the risk and requirement to submit a safety plan prior to use of the area.	Restrict and (or) close land uses and public access to areas listed in the FUDS listing.	Restrict and (or) close land uses and public uses identified as high risk until the risk is minimized.	Identify acceptable land uses and public access to areas listed in the FUDS listing.	With the exception of livestock grazing, commercial use would be allowed with notification of the risk and a requirement to submit a safety plan prior to use of the area.

Note: Restrictions on resource uses (e.g., closed to leasing) apply to the life of the RMP, but can be changed by amending the RMP. Closed to leasing means deferred from leasing for the life of the plan.

AAQS	ambient air quality standards	FM	fire management and ecology	PR	physical resources
ACEC	Area of Critical Environmental Concern	FUDS	Formerly Used Defense Site	PSD	Prevention of Significant Deterioration
AMP	Allotment Management Plan	GIS	Geographic Information System	R&PP	Recreation and Public Purposes
ANS	artificial nesting structure	GPS	Global Positioning System	RAMP	Recreation Area Management Plan
APE	Area of Potential Effect	H_2S	hydrogen sulfide	RMP	Resource Management Plan
APHIS	Animal and Plant Health Inspection Service	HMP	Habitat Management Plan	RMU	resource management units
AQD	Air Quality Division	HR	heritage and visual resources	ROD	Record of Decision
AQRV	Air Quality Related Value	IM	Instruction Memorandum	ROW	rights-of-way
ATV	all-terrain vehicle	INPS	Invasive Nonnative Plant Species	SD	special designations
AUM	animal unit month	KGS	known geologic structure	SDW	Stock driveway
BLM	Bureau of Land Management	LAC	level of acceptable change	SIP	State Implementation Plan
BMP	Best Management Practice	LBA	Lease by Application	SMA	Special Management Area
BR	biological resources	LOC	level of concern	SR	socioeconomic resources
C&MU	Classification & Multiple Use	LR	land resources	SRMA	Special Recreation Management Area
CBNG	coalbed natural gas	MBF	thousand board feet	TCP	Traditional Cultural Property
CDPA	Coal Development Potential Area	MOU	Memorandum of Understanding	TLS	timing limitation stipulation
CFR	Code of Federal Regulation	MR	mineral resources	U.S.C.	United States Code
CRMP	Coordinated Resource Management Plan	NEPA	National Environmental Policy Act	USBR	U.S. Bureau of Reclamation
CSU	controlled surface use	NHPA	National Historic Preservation Act	USDI	U.S. Department of the Interior
DEQ	Department of Environmental Quality	NHT	National Historic Trail	USFS	U.S. Forest Service
DFC	desired future condition	NPS	National Park Service	USFWS	U.S. Fish and Wildlife Service
DPC	desired plant community	NRHP	National Register of Historic Places	USGS	U.S. Geological Survey
EA	Environmental Assessment	NSO	no surface occupancy	VRM	Visual Resource Management
EEA	Environmental Education Area	NSS	Native Species Status	WGFD	Wyoming Game and Fish Department
EIS	Environmental Impact Statement	Obj.	objective	WO	Washington Office
EPA	U.S. Environmental Protection Agency	OHV	Off-highway vehicle	WQLS	water quality limited segment
ESA	Endangered Species Act	ORV	off-road vehicle	WUI	Wildland-Urban Interface
FLPMA	Federal Land Policy and Management Act	PFC	proper functioning condition		

2.6 Summary of Environmental Consequences by Alternative

Table 2-4 (Summary of Environmental Consequences by Alternative) summarizes potential meaningful impacts anticipated from activities within the Casper planning area by alternative. Where applicable, potential impacts anticipated from BLM actions are quantified. Table 2-4 summarizes the difference of impacts to alternatives in acres and actions. For example, a greater acreage implies a greater impact (either beneficial or adverse). A more detailed comparison of impacts between alternatives is summarized in the conclusion for each resource section in Chapter 4. Cumulative impacts from non-BLM actions are described in Chapter 4 but are not included in Table 2-4.

The environmental consequences of alternatives are not anticipated to exceed known legal thresholds or standards over the life of the plan. Standard practices, best management practices, and guidelines for surface disturbing activities are built into each alternative to avoid and minimize potential impacts. Mitigation of residual impacts will be considered during subsequent implementation decision plans and any associated environmental analyses conducted at that time. Reclamation will be applied to surface disturbance under all alternatives to reduce the amount of long-term impact.

Table 2-4. Summary of Environmental Consequences by Alternative

Resources	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Air Quality					
NAAQS	Not anticipated to exceed except low potential for ozone	Not anticipated to exceed except low potential for ozone	Not anticipated to exceed except low to moderate potential for ozone	Not anticipated to exceed except moderate potential for ozone	Not anticipated to exceed except low to moderate potential for ozone
WAAQS	Not anticipated to exceed except low potential for ozone	Not anticipated to exceed except low potential for ozone	Not anticipated to exceed except low to moderate potential for ozone	Not anticipated to exceed except moderate potential for ozone	Not anticipated to exceed except low to moderate potential for ozone
PSD Deterioration[1]	Potential	Potential	Potential	Potential	Potential
Visibility Impacts[1]	Potential	Potential	Potential	Potential	Potential
Atmospheric Deposition[1]	Not anticipated	Not anticipated	Not anticipated	Not anticipated	Not anticipated
Soil and Water					
Floodplain Impacts	Not anticipated	Not anticipated	Not anticipated	Not anticipated	Not anticipated
Groundwater Impacts	Potential	Lowest Potential	Potential	Potential	Potential
Produced Water Impacts	Potential	Lowest Potential	Potential	Potential	Potential
Acres of Surface Disturbance Anticipated	59,990 short-term/ 21,087 long-term	36,650 short-term/ 11,565 long-term	58,689 short-term/ 20,358 long-term	63,649 short-term/ 22,080 long-term	61,274 short-term/ 21,672 long-term
Exceed Water Quality Standards	Not anticipated	Not anticipated	Not anticipated	Not anticipated	Not anticipated
Minerals					
Acres Open to Oil and Gas and Other Leasables with Major/Moderate Constraints	770,991/ 2,711,404	2,296,267/ 1,196,922	1,113,078/ 2,058,162	662,664/ 2,445,107	843,139/ 2,506,530
Acres of BLM Withdrawals, Classifications, and Segregations	488,531	2,253,132	1,314,556	52,243	578,699
Acres of Other Federal Withdrawals, Classifications, and Segregations	41,589	48,955	48,955	35,267	48,955

Table 2-4. Summary of Environmental Consequences by Alternative (Continued)

Resources	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Acres Unacceptable for Further Consideration for Coal Leasing	2,266	4,657,172	4,657,172	2,266	2,266
Acres Closed to Disposal of Mineral Materials (Salable)	52,576	757,130	303,633	43,344	257,941
Reduction in Total Wells From Baseline (1988 wells)/ Projected Federal Wells Drilled	8% (1,823)	90% (190)	16% (1,664)	9% (1,800)	9% (1,813)
Vegetation					
Sagebrush, Aspen, and Mountain Shrub Management Impacts	All acres managed for DFC	All acres managed for DPC	50% of acres managed for DPC	25% of acres managed for DPC	All acres managed for DPC
Acres Managed to Retain Intact Blocks of Native Vegetation	0	413,552	177,035	0	131,879
Riparian/Wetland					
Wetland Impacts	Not anticipated	Not anticipated	Not anticipated	Not anticipated	Not anticipated
Wetland Permit Required	No	No	No	No	No
Miles of Lotic and Adjacent Riparian Habitat Managed for PFC or DPC	350	350	350	350	350
Acres of Lentic Habitat Managed for PFC or DPC	10,000	10,000	10,000	10,000	10,000
Incised Stream Miles Restored	0	108	75	33	33
INPS					
Acres of Salt Cedar Eradication	0	1,700	1,275	850	0
Fish and Wildlife					
Acres of Fish and Wildlife Reservoirs Developed	0	1,000	500	100	100
Acres of Big Game CWR Impacted November 15 through April 30	0	0	0	0	0
Special Status Species					
Acre-Feet of Water Depleted in North Platte Watershed	79	2	1,054	272	270
Adverse Effects to ESA Species within the Planning Area	Anticipated	Anticipated	Anticipated	Anticipated	Anticipated
Critical Habitat Impacts	Not anticipated	Not anticipated	Not anticipated	Not anticipated	Not anticipated
Heritage					
Eligible/Listed Cultural Sites Impacts	Potential	Lowest potential	Potential	Potential	Potential
Renewable Energy					
Wind-Energy Development Power Classes 6 and 7 Exclusion Areas	N/A[2]	89,356	43,919	3,593	31,948
Wind-Energy Development Power Classes 6 and 7 Avoidance Areas	N/A[2]	29,768	55,216	71,468	65,099

Table 2-4. Summary of Environmental Consequences by Alternative (Continued)

Resources	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Wind-Energy Development Power Classes 3, 4 and 5 Exclusion Areas	N/A[2]	817,977	517,831	178,013	331,630
Wind-Energy Development Power Classes 3, 4 and 5 Avoidance Areas	N/A[2]	118,056	221,071	351,293	392,907
Rights-of-Way and Corridors					
Acres Unavailable for Location of ROWs (ROW Exclusion)	208,664	1,099,606	676,193	238,013	442,040
Acres Where ROWs are Restricted in a Minor Way (ROW Avoidance)	723,619	167,379	311,758	489,922	539,799
OHV Use					
Acres Closed to OHV Use	2,661	26,027	7,943	2,661	2,224
Acres Open to OHV Use	187	242	285	285	285
Acres Limited to Existing Roads and Trails	1.311,715	909,651	1,162,113	1,292,630	1,162,244
Acres Limited to Designated Roads and Trails	47,014	425,657	191,236	66,001	196,824
Livestock Grazing					
AUMs Projected/ Change from Baseline (182,479)	179,977 1% decrease	181,247 1% decrease	180,075 1% decrease	179,845 1% decrease	179,899 1% decrease
Visual Resources					
Acres VRM Class II	109,827	408,576	367,151	205,542	367,151
Acres VRM Class III	210,258	415,458	433,799	548,780	433,799
Acres VRM Class IV	953,543	537,543	560,627	607,255	560,627
Special Designations					
Number and Acres of Special Designations Focusing on Resource Conservation	***2 ACECs*** 81,504 BLM AS 214,332 BLM FME	***7 ACECs*** 254,953 BLM AS 487,474 BLM FME	***5 ACECs*** 92,276 BLM AS 242,823 BLM FME	***1 ACEC*** 3,938 BLM AS 11,104 BLM FME	***2 ACECs*** 9,220 BLM AS 16,909 BLM FME
	0 SMAs	***2 SMAs*** 175,656 BLM AS 306,137 BLM FME	***4 SMAs*** 394,292 BLM AS 632,985 BLM FME	***1 SMA*** 5,282 BLM AS 5,805 BLM FME	***2 SMAs*** 231,601 BLM AS 382,050 BLM FME
Number and Acres of Special Designations Focusing on Resource Development	***0 ACECs***	***0 ACECs***	***0 ACECs***	***0 ACECs***	***0 ACECs***
	0 SMAs	***0 SMAs***	***2 SMAs*** 119,726 BLM AS 255,724 BLM FME	***2 SMAs*** 248,854 BLM AS 526,035 BLM FME	***2 SMAs*** 37,602 BLM AS 66,530 BLM FME
National Historic Trails and Other Historic Trails					
Impacts to NHTs and Other Historic Trails	Potential	Lowest potential	Potential	Potential	Potential

Notes: Based upon the programmatic and strategic nature of the RMP alternatives, this table reflects the potential for environmental consequences.
Closed to leasing means deferred from leasing for the life of the plan.
[1] These impacts anticipated to occur outside the planning area.
[2] Alternative A: renewable-energy avoidance areas for all power classes = 723,619 acres
Alternative A: renewable-energy exclusion areas for all power classes = 208,664 acres

ACEC	Area of Critical Environmental Concern	INPS	Invasive, Nonnative Plant Species
AQRV	Air Quality Related Value	NAAQS	National Ambient Air Quality Standards
AUM	animal unit month	N/A	Not Applicable
AS	Administered Surface	NHT	National Historic Trail
BLM	Bureau of Land Management	OHV	off-highway vehicle
CWR	Crucial Winter Range	PFC	Proper Functioning Condition
DFC	Desired Future Condition	ROW	rights-of-way
DPC	Desired Plant Community	SMA	Special Management Area
ESA	Endangered Species Act	VRM	Visual Resource Management
FME	federal mineral estate	WAAQS	Wyoming Ambient Air Quality Standards

CHAPTER 3
AFFECTED ENVIRONMENT

Roadmap to Chapter 3

Chapter 3 discussions are grouped by general resource topics as outlined below.

Overview of the Planning Area (Page 3-1)
- Natrona County
- Converse County
- Platte County
- Goshen County

3.1. Physical Resources (Page 3-4)
- Air Quality
- Geologic Resources
- Soil
- Water

3.2. Mineral Resources (Page 3-17)
- Locatable
- Leasable
  - Coal
  - Geothermal
  - Oil and Gas
  - Other Solid Leasables
- Salable

3.3. Fire Management and Ecology (Page 3-31)
- Unplanned/Wildland Fire
- Planned/Prescribed Fire
- Rehabilitation

3.4. Biological Resources (Page 3-34)
- Vegetation
  - Forests, Woodlands, and Forest Products
  - Grassland and Shrubland Communities
  - Riparian and Wetland Communities
  - Invasive Nonnative Plant Species and Pest Control
- Fish and Wildlife Resources
  - Fish
  - Wildlife
- Special Status Species
  - Plants
  - Fish
  - Wildlife

3.5. Heritage and Visual Resources (Page 3-84)
- Cultural Resources
- Paleontological Resources
- Visual Resources

3.6. Land Resources (Page 3-92)
- Lands and Realty
- Renewable Energy
- Rights-of-Way and Corridors
- Transportation
- Off-Highway Vehicles (OHV)
- Livestock Grazing
- Recreation

3.7. Special Designations (Page 3-112)
- Areas of Critical Environmental Concern and Other Special Management Areas
- National Back Country Byways
- National Historic Trails and Other Historic Trails
- Wild and Scenic Rivers

3.8. Socioeconomic Resources (Page 3-125)
- Social Conditions
- Economic Conditions
- Health and Safety
- Environmental Justice
- Tribal Treaty Rights

CHAPTER 3
AFFECTED ENVIRONMENT

Chapter 3 describes existing conditions for Bureau of Land Management (BLM) resource programs, resource uses, special designations, and the socioeconomic environment within the Casper Field Office planning area. Management of resources and resource uses on public lands administered by the BLM is directed by a variety of laws, regulations, policies, and other requirements. The Casper Field Office operates under applicable requirements and guidance set forth in Appendix B. The Casper Field Office also considers Best Management Practices (BMPs) in the management of resources and resource uses in the planning area. Appendix K identifies select sources of BMPs.

In addition to describing existing conditions, Chapter 3 identifies, where appropriate, management challenges for resource programs and resource uses on BLM-administered land. These management challenges were identified by the BLM's Management Situation Analysis (MSA), as well as by issues identified during the scoping process for revising the 1985 Platte River RMP (BLM 1985b). By describing existing conditions for resource programs in the planning area, this chapter serves as the baseline against which the impacts of the different alternatives are analyzed and compared in Chapter 4.

Overview of the Planning Area

The planning area comprises 1,361,577 acres of BLM-administered surface land and 4,657,172 acres of BLM-administered mineral estate in Converse, Goshen, Natrona, and Platte Counties in eastern-central Wyoming (see Maps 1 and 2). Except for Natrona County, most BLM-administered surface land in the planning area comprises scattered tracts intermingled with state and private lands.

The planning area encompasses the intersection of two physiographic regions—the Interior Plains to the east and the Rocky Mountain System to the west. The eastern planning area generally is characterized as rangeland with low annual rainfall (less than 20 inches) and marginal farmland. Most of the western planning area is included in the broad intermountain basins. This western part is classified as shrub-steppe dominated by sagebrush and interspersed with shortgrass prairie. As elevation increases, dominant vegetation transitions from sagebrush and grassland to mountain shrublands and, ultimately, to coniferous forests. Elevations in the planning area range from less than 4,000 feet in the North Platte River Basin to approximately 9,000 feet above mean sea level (msl) in the Laramie Mountains.

The planning area includes portions of the Wind River Basin to the west and the Powder River Basin to the northeast. The Casper Arch, a northwest-trending structural divide of low relief that connects the South Bighorns and the Laramie Range (NRCS 1983), separates these two basins.

Within the planning area, precipitation ranges from more than 30 inches annually in the mountains to under 10 inches in some grasslands. The climate of the planning area is classified as semiarid with a wide variation in daily and annual temperatures due to relatively high elevation and dry air. Summer temperatures average 67-degrees Fahrenheit (ºF), while winter temperatures average 25 ºF.

Soils and vegetation in the planning area generally provide rangeland suitable for year-round cattle and sheep grazing at lower elevations; however, supplemental feeding often is required, especially at higher elevations.

Limited small grains exist where water is available and suitable soils exist. Irrigated hay and pasture contribute to agricultural production in the planning area. Agriculture production is limited by low precipitation and scarcity of surface water. Small reservoirs, intermittent streams, and livestock-watering tanks supplement limited surface water.

Natrona County

Natrona County was established in 1888, the same year Casper, Wyoming, was named as the county seat. Pioneers traveling west in the mid to late 1800s generally followed the Mormon and Oregon trails. Early settlers established homesteads in the area in the late 1800s and large ranches of sheep and cattle took advantage of the vast rangeland. The Salt Creek and other early oil fields established the energy industry in this part of the planning area. Today, energy and agriculture remain important commodities of the area's economy.

Highway 26 generally bisects the middle of Natrona County as it traverses east to west between Casper and Waltman. Interstate Highway 25 (I-25) is the primary north-south transportation corridor between Casper and Buffalo. Southern routes from Casper generally follow Highway 220 to Alcova and Highway 487. Approximately 5,000 acres of the Medicine Bow National Forest are in southeast Natrona County.

The North Platte River runs through Natrona County and includes Alcova Reservoir and a portion of Pathfinder Reservoir. The Alcova Reservoir in the Casper-Alcova Irrigation District (NRCS 1997) supplies water to most of the irrigated land in Natrona County. Energy development in Natrona County began in 1883 with the first oil well and continues today, primarily involving oil, gas, and uranium.

Natrona County comprises approximately 3,016,762 surface acres, of which the BLM administers approximately 1,124,485 acres. In addition, BLM administers approximately 2,362,582 acres of federal mineral estate in Natrona County. The Lander Field Office administers a portion of the northwest corner of Natrona County.

Converse County

Converse County was established in 1888, the same year Douglas, Wyoming, was named as the county seat. Early explorers traveled west along the North Platte River, followed later by pioneers traveling routes later identified as the Mormon and Oregon Trails. Homesteaders began settling in the late 1800s and by the early 1900s, the area was producing oil and gas. Agriculture and energy production continue today as the primary economic commodities in Converse County.

I-25 bisects the southern half of Converse County as it traverses east to west between Casper and Douglas. In Douglas, the southern terminus of Highway 59 begins at I-25 and travels north through the Thunder Basin National Grasslands and on into Campbell County and Gillette, Wyoming. The Medicine Bow National Forest extends into southern Converse County south of I-25.

The North Platte River runs west to east through Converse County and the North Platte watershed drains the southern half of this county. The Cheyenne watershed drains most of the northern half of Converse County. Energy development in Converse County began in the early 1900s and continues today, primarily involving oil, gas, uranium, and coal.

Converse County comprises approximately 2,727,850 surface acres, of which the BLM administers approximately 129,947 acres. In addition, the BLM administers approximately 1,619,626 acres of federal mineral estate in the county.

Platte County

Platte County was established in 1911, the same year Wheatland, Wyoming, was named as the county seat. Although pioneers traveled west along the Oregon Trail, the area known today as Platte County was occupied primarily by Native Americans and fur trappers until the late 1860s, when cattle ranches moved into the area. Agriculture remains an important economic commodity in Platte County. The Laramie River Station power plant northeast of Wheatland also plays an important role in the area's economy.

Platte County is bisected by I-25 as it traverses north-south between Glendo and Chugwater. Between Glendo and Wheatland, Highway 26 travels east to Guernsey and on to Torrington in Goshen County.

The North Platte River runs through northeast Platte County and includes the Glendo and Guernsey reservoirs. Mining plays a relatively minor role in Platte County's economy; however, the Laramie River Station power plant is a consumer-owned coal power plant that contributes to the area's economy.

Platte County comprises approximately 1,349,343 surface acres, of which the BLM administers approximately 81,965 acres. In addition, the BLM administers approximately 422,602 acres of federal mineral estate in Platte County.

Goshen County

Goshen County was established in 1911, the same year Torrington, Wyoming, was named as the county seat. Beginning in 1843, the area became a gateway for early explorers and pioneers traveling west via the North Platte River and the Oregon and Mormon Trails. Agriculture became a primary commodity early in Goshen County's history and remains so today.

Highway 26 parallels the North Platte River traversing west to east between Guernsey and Torrington. Highway 85 intersects Highway 26 and is the primary north-south trending transportation corridor in the county.

Goshen County comprises approximately 1,427,392 surface acres, of which the BLM administers approximately 25,180 acres. In addition, the BLM administers approximately 252,362 acres of federal mineral estate in Goshen County.

3.1 Physical Resources

Physical resources in the planning area include air quality, geologic resources, soil, and water. Each of the four resource sections includes a definition and description of the resource, the current condition of the resource, management challenges where appropriate, and management actions.

3.1.1 Air Quality

This section describes the climate and existing air quality in the region potentially affected by alternatives described in Chapter 2. Air pollutants addressed in this Environmental Impact Statement (EIS) include criteria pollutants, hazardous air pollutants (HAPs), and compounds that could cause visibility impairment or atmospheric deposition. Regional air quality is influenced by the interaction of several factors, including meteorology, climate, the magnitude and spatial distribution of local and regional air pollutant sources, and the chemical properties of emitted air pollutants.

Climate

The planning area is located in a semi arid midcontinental climate regime typified by dry windy conditions, limited rainfall, and long cold winters (Trewartha and Horn 1980). Table 3-1 summarizes components of climate that could affect air quality in the region.

Table 3-1. Summary of the Climate in the Casper Planning Area

Climate Component	Description
Temperature	Daily maximum summer temperature: 83.4 ^{o}F Daily minimum winter temperature: 13.9 ^{o}F Mean annual temperature: 45.1 ^{o}F
Precipitation	Mean annual precipitation: 12.5 inches Mean annual snowfall: 77.5 inches Mean winter snow depth: 1 inch
Winds	Mean annual wind speed: 12.8 mile per hour (mph) Prevailing wind direction: southwest

Source: Western Regional Climate Center 2006

Existing Air Quality

Components of air quality addressed in this environmental impact statement (EIS) include concentrations of air pollutants, visibility, and atmospheric deposition:

- Air pollutant concentration is an indicator of breathable, healthful air
- Visibility is an indicator of our ability to see the landscape around us
- Atmospheric deposition is an indicator of the health of terrestrial and aquatic ecosystems.

Air quality in the planning area generally is considered to be good based on the limited amount of air quality monitoring currently being conducted in the area. The planning area has no regions that are designated as nonattainment for National Ambient Air Quality Standards (NAAQS) or Wyoming Ambient Air Quality Standards (WAAQS).

Concentrations

Pollutant concentration refers to the mass of pollutant present in a volume amount of air, and can be reported in units of micrograms per cubic meter ($\mu g/m^3$), parts per million (ppm) or parts per billion (ppb).

Figure 3-1 shows the PM_{10} (particulate matter less than 10 microns in diameter) data collected over the last 11 years at the State and Local Air Monitoring Station (SLAMS) located in Casper, Wyoming. The data are shown for both the 24-hours and annual averages as a percent of the respective NAAQS. The BLM supports ambient air quality monitoring programs within Wyoming for criteria pollutants, visibility, and air quality-related values in Class I pristine areas.

Visibility

Several national parks, wilderness areas, and national monuments exist in the region. Table 3-2 presents a list of these Class I and Class II areas within 100 miles of the planning area. The Bridger Wilderness Area is the closest Class I area to the west of the planning area; Wind Cave National Park is the closest Class I area to the east.

Table 3-2. National Parks, Wilderness Areas, and National Monuments in the Vicinity of the Casper Planning Area

Areas	Closest Distance to the Casper Planning Area (miles)	Direction from the Casper Planning Area	Clean Air Act Status of the Area
Bridger Wilderness Area	90	West	Class I
Fitzpatrick Wilderness Area	100	West	Class I
Washakie Wilderness Area	>100	Northwest	Class I
Teton Wilderness Area	>100	Northwest	Class I
North Abasaroka Wilderness Area	>100	Northwest	Class I
Cloud Peaks Wilderness Area	65	North	Class II
Grand Teton National Park	>100	Northwest	Class I
Yellowstone National Park	>100	Northwest	Class I
Wind Cave National Park	75	East	Class I
Badlands National Park	>100	East	Class I
Jewell Cave National Monument	50	East	Class II

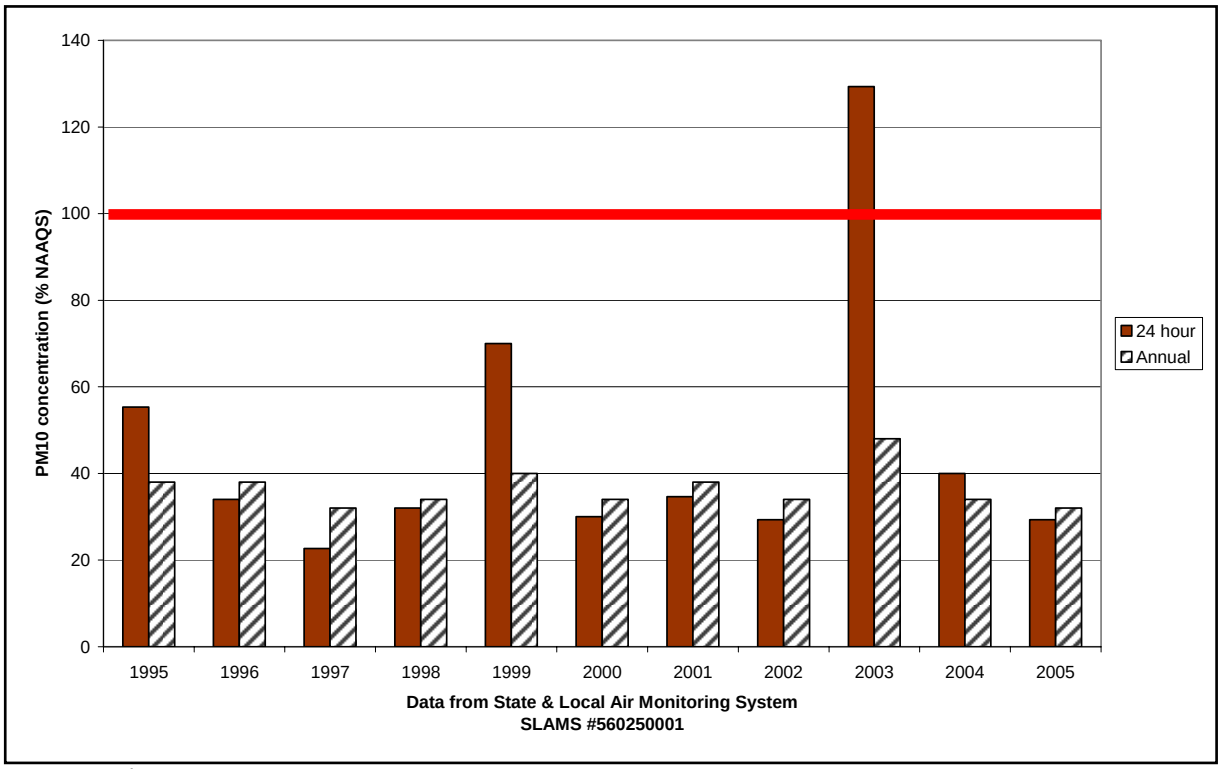
Source: NPS 2006

The BLM works cooperatively with several other federal agencies to measure visibility with the Inter-Agency Monitoring of Protected Visual Environments (IMPROVE) network. The IMPROVE station operating in the Class I area nearest to the planning area, approximately 90 miles to the west, is in the Bridger Wilderness Area. Figure 3-2 shows the visual range measured in the Bridger Wilderness Area over the last 15 years.

Atmospheric Deposition

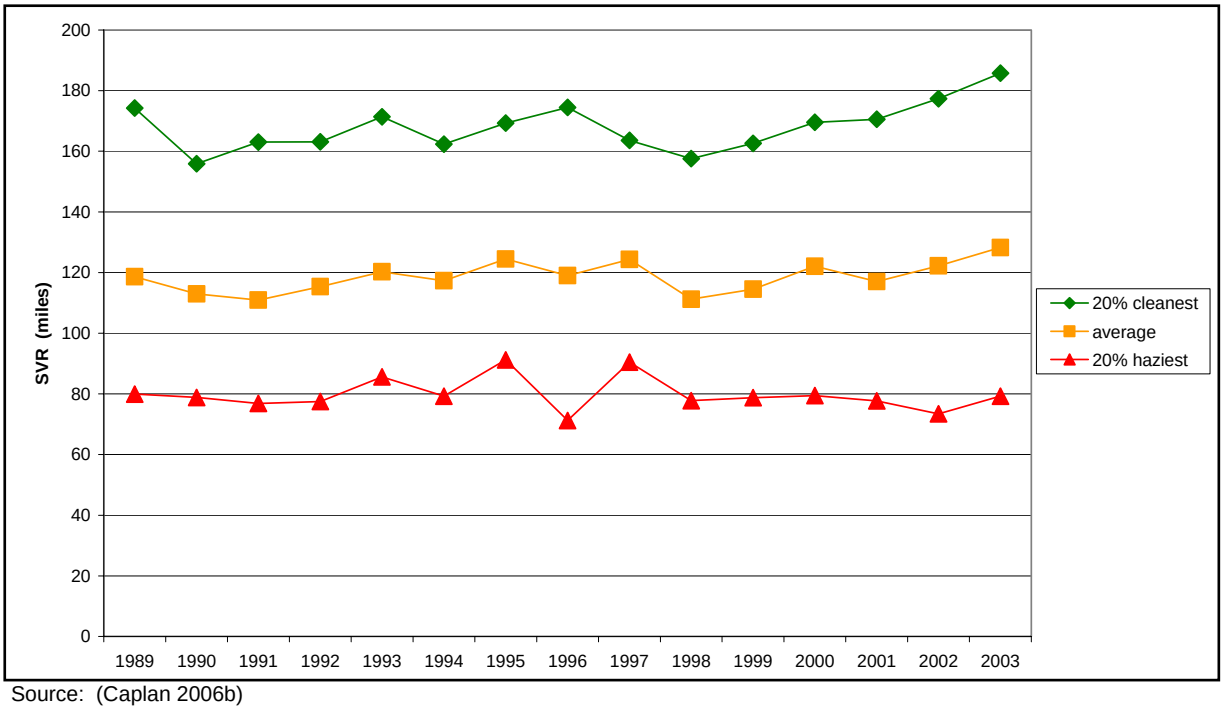
Atmospheric deposition refers to processes in which air pollutants are removed from the atmosphere and deposited into terrestrial and aquatic ecosystems. Much of the concern about deposition is due to secondary formation of sulfur and nitrogen compounds, which may contribute to acidification of lakes, streams, and soils and affect other ecosystem characteristics, including nutrient cycling and biological diversity.

Figure 3-1. Particulate Matter Concentrations in Casper, Wyoming



Source: Caplan 2006a

Figure 3-2. Annual Visibility (Standard Visual Range [SVR]) in the Bridger Wilderness Area



Source: (Caplan 2006b)

The secondary formation of pollutants occurs when primary pollutants (such as nitrogen oxides [NO_x] or sulfur dioxide [SO_2]) chemically react in the atmosphere to produce new compounds, such as nitrates or nitric acid that can have additional effects on fragile ecosystems.

Air pollutants can be deposited by either wet (precipitation) or dry (gravitational settling of particles and adherence of gaseous pollutants to soil, water, and vegetation) deposition. The BLM works cooperatively with the U.S. Environmental Protection Agency (EPA) to measure dry deposition. Three Clean Air Status & Trends Network (CASTNet) stations operate in Wyoming. The CASTNet stations nearest to the planning area are located in Centennial and Pinedale, Wyoming. The BLM works cooperatively with private, state and other federal organizations to measure precipitation chemistry and wet deposition. Eight National Atmospheric Deposition Program (NADP) stations operate in Wyoming. Figure 3-3 presents the wet deposition data collected near Pinedale (close to the Bridger Wilderness Area) for more than 20 years, and Figure 3-4 presents the dry deposition collected near Pinedale for 15 years.

Hazardous Air Pollutants

Hazardous Air Pollutants (HAPs) include air pollutants that can produce serious illnesses or increased mortality, even in low concentrations. HAPs are compounds that have no established federal ambient standards, but they may have thresholds established by some states and are typically evaluated for potential chronic inhalation and cancer risks. The impact of HAPs on sensitive members of the population is a special concern of the BLM. Sensitive groups include children, the elderly, and the acutely and chronically ill. Existing sources of HAPs within the planning area include (1) fossil fuel combustion that emits HAPs, such as formaldehyde, and (2) oil and gas operations that emit volatile organic compounds (VOCs) and may emit hydrogen sulfide (H_2S).

Existing Emissions in the Planning Area

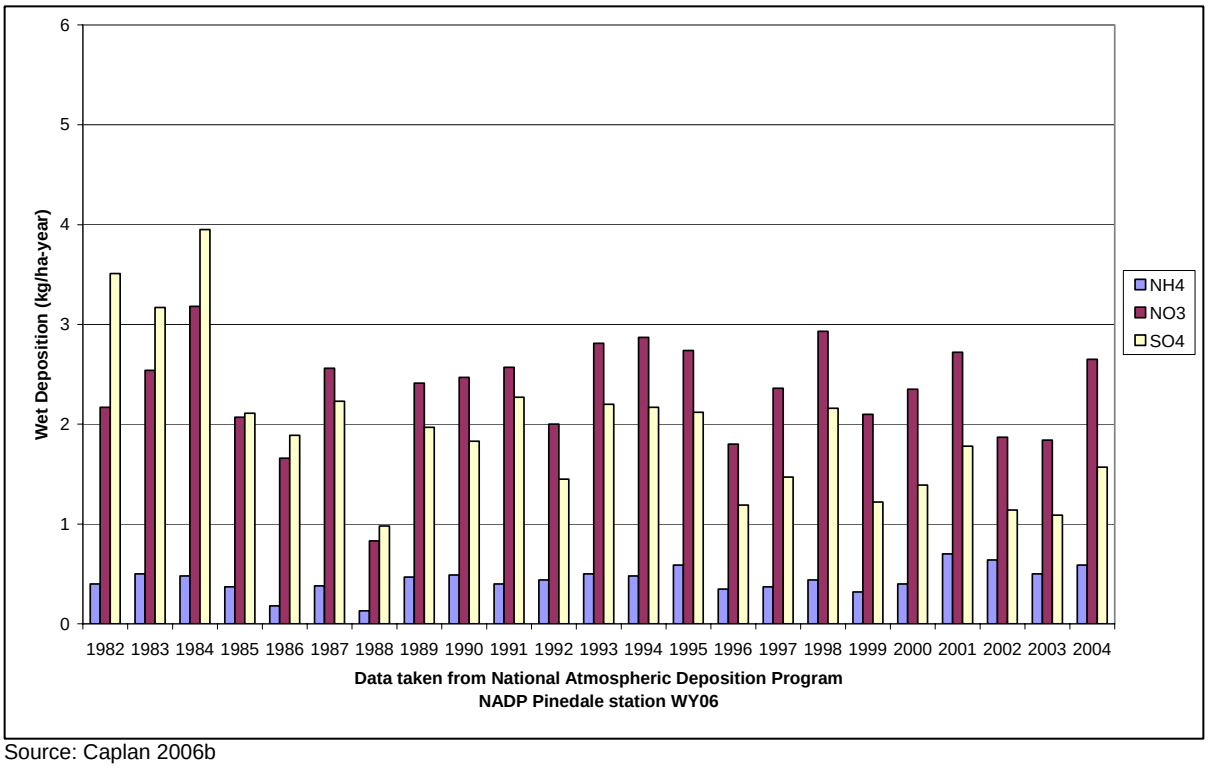
Table 3-3 presents an estimate of annual emissions within the planning area from resource-related sources during 2001. These data show that the main contributors to emissions include oil and gas development and production, salable minerals, locatables, and coal mines. Year 2001 activities are used to define existing air quality conditions in the planning area for the purpose of comparing the impacts of future emissions from each alternative.

Table 3-3. Year 2001 Annual Emissions for BLM Activities within the Casper Planning Area

Project Scenario/Resource	Emissions (Tons per Year)						
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	CO	VOC	HAPs
Emission Sources							
Natural Gas Development/Production	85	34	431	6	394	2,599	267
Oil Development/Production	64	21	449	59	113	15	1
Locatable Minerals	151	21	19	2	49	7	1
Salable Minerals	295	38	19	0	9	2	0
Coal Mine	480	112	373	14	0	0	0
OHVs	7	7	3	0	427	230	23
Minor Emission Sources							
Resource Roads	1	0	0	0	0	0	0
ROW and Corridors	20	5	16	2	22	5	1
Livestock Grazing	11	2	1	0	1	0	0
Vegetation Management	1	0	0	0	0	0	0
Year 2001 Totals	**1,116**	**241**	**1,311**	**84**	**1,016**	**2,858**	**293**

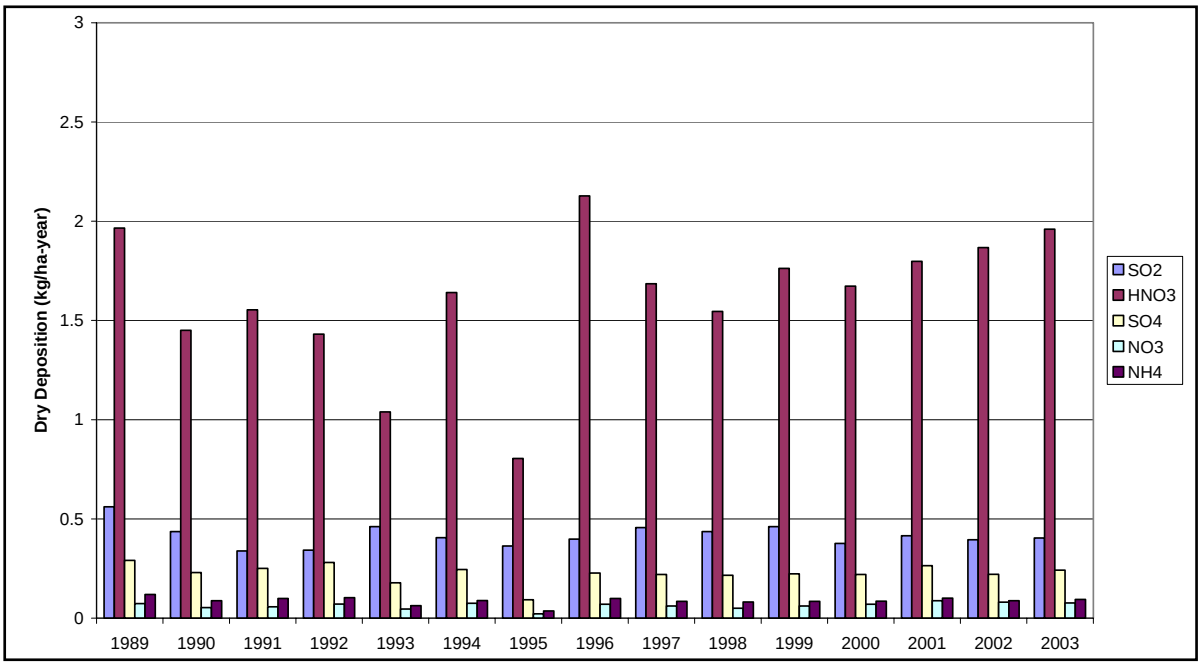
Source: BLM 2005c
Note: Due to rounding, column entries may not sum to total.
CO carbon monoxide
HAP Hazardous air pollutant
NO_x nitrogen oxides
OHV off-highway vehicle
PM_{10} particulate matter less than 10 microns in diameter
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
ROW rights-of-way
SO_x sulfur oxides
VOC volatile organic compounds

Figure 3-3. Mean Annual Wet Deposition near Pinedale, Wyoming



Source: Caplan 2006b

Figure 3-4. Mean Annual Dry Deposition near Pinedale, Wyoming



Source: Caplan 2006b

Management Challenges

Three management challenges identified for air quality in the planning area are based, in part, on historic activities and current conditions and trends. First, the regulation of air quality standards, emission controls and other requirements are primarily the responsibility of other agencies, such as the Wyoming Department of Environmental Quality (DEQ) and the Environmental Protection Agency (EPA). The BLM works cooperatively with these regulatory agencies, as well as other land management agencies such as the U.S. Forest Service (USFS) and the National Park Service (NPS). Second, the development of mechanisms to better characterize the current status and future trends in air quality, such as establishing long-term air quality monitoring stations, is expensive and may be difficult to accomplish within current budgets. Third, prescribed burning is a tool that has potential benefits in managing the resource area, but also has air quality implications that need to be considered, including possible public health and visibility impacts.

Management actions anticipated to address the above challenges include characterizing the current status and future trends in ambient air quality in the region potentially affected by activity within the planning area, determining the range of air quality issues in the planning area, and implementing actions to maintain compliance or improve air quality. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.1.2 Geologic Resources

Wyoming, as a whole, and the planning area, in particular, lie within two physiographic regions—the Interior Plains and the Rocky Mountain System. Within the Interior Plains, the Northern Great Plains Province encompasses Goshen County, parts of Platte and Converse Counties, and the northeast portion of Natrona County. The Hartville Uplift further subdivides this region with the Natrona and Converse County portions defined as part of the unglaciated Missouri Plateau and the Goshen and Platte County portions defined as part of the High Plains. The Northern Rocky Mountains, Southern Rocky Mountains, Wyoming Basin, and Middle Rocky Mountains provinces comprise the Rocky Mountain System. The Laramie Mountains, which cover parts of Platte, Converse, and Natrona counties, are considered part of the Southern Rocky Mountain region. The Bighorn Mountains in northwestern Natrona County are part of the Middle Rocky Mountain region. Southwestern Natrona County, west of the Casper Arch, lies within the Wyoming Basin Province (USGS 2003a).

The physiography of the planning area reflects the underlying structural geology. Portions of two districts of the Interior Plains—the unglaciated Missouri Plateau and the High Plains—overlie portions of the Powder River and Denver-Julesberg basins, respectively. The Hartville Uplift separates these areas both physically and structurally. The uplifts responsible for the Bighorn Mountains, Casper Arch, and Laramie Mountains also form the western physical and structural boundaries for the Powder River and Denver-Julesberg basins, respectively. These same uplifts also separate these two basins from portions of the Wind River and Shirley Basins, which underlie the Wyoming Basin Province. The Sweetwater Uplift separates the Wind River and Shirley basins. These structural features—the uplifts, basins, and associated faulting—are part of the Rocky Mountain Foreland that developed during the Laramide Orogeny, a series of mountain-building episodes that lasted from the Late Cretaceous Period to the end of the –Eocene Epoch (70 to 50 million years ago).

Geologic Formations

The rock sequence of the planning area represents a complex history that extends back perhaps 2.6-billion years to Precambrian time. There are many gaps, or unconformities, in the rock sequence in which millions of years of history are missing due to erosion or nondeposition. Further complications arise because rocks of the same age may have different names and lithologies, depending on where they are

located in the planning area. Boyd et al. (1989) discuss problems in stratigraphic nomenclature in further detail. The following discussion covers some of the more important formations in the stratigraphic sequence.

The oldest rocks in the planning area are Precambrian igneous and metasedimentary rocks exposed in the Laramie Mountains and the South Bighorns, where they have been faulted and uplifted. A major unconformity separates the Precambrian rocks from younger Cambrian-aged Flathead Sandstone, Gros Ventre Formation, Deadwood Formation, and Gallatin Limestone. Moving up in the rock sequence, the Bighorn Dolomite and the equivalent Whitewood Dolomite are the dominant units of the Ordovician. In parts of the Powder River and Wind River basins, the Lander Sandstone underlies the Bighorn Dolomite. No rocks of Silurian age appear to be within the planning area. In the Wind River Basin, the Beartooth Butte and Darby formations represent the Devonian. Above the Devonian, the Mississippian-aged Madison Limestone is a widespread sequence of massive limestone and dolomite that may also include a feldspar-rich basal sandstone. During the Pennsylvanian Period, the Amsden Formation and Tensleep Sandstone were deposited in the Wind River Basin and western part of the Powder River Basin. Equivalent-aged Minnelusa Formation sediments accumulated in the eastern Powder River Basin, while the Fountain and Casper formations built up to the south and east into what are now known as the Denver and Shirley basins. From the Permian Period into the Triassic Period, a series of reddish-colored shales, siltstones, sandstones, carbonates, and evaporites were deposited. Major stratigraphic units of this period include the Permian Goose Egg and Phosphoria formations in the western Powder River, the eastern Wind River, and the northeastern Shirley Basins; the Permian Minnekatha and Forelle Limestone in the Denver-Julesberg Basin; and the uppermost Triassic Chugwater Group, which includes the Alcova Limestone, in all basins.

Above an unconformity come the rocks of the Jurassic Period, which include the Gypsum Springs, Sundance, and fossil-rich Morrison formations. Separated from the Jurassic rocks by another unconformity are the rocks of the Early Cretaceous Period. The nomenclature across the planning area becomes more complicated at this point, but some of the important formations from an oil and gas standpoint include the Dakota and Muddy Sandstones and intervening Thermopolis or Skull Creek Shale.

During the Laramide Orogeny, from the Late Cretaceous Period to the end of the Eocene Epoch, deposition of a series of economically important formations occurred. The shales in this series served as source rocks for oil and gas, while the sandstones and limestones became reservoir rocks. The Mowry Shale is the oldest of this sequence. The Frontier Formation, an important petroleum reservoir, and its equivalents overlie the Mowry. Above this are the Carlile Shale and the Niobrara Formation. The Cody (Pierre) Shale overlies the Niobrara in most of the planning area, while in the western part, the Cody Shale and Mesaverde Formation interfinger. The Paleocene Fort Union Formation lies above the Cretaceous formations and contains the bulk of the coal and coalbed natural gas (CBNG) reserves in the planning area. The youngest rocks include the Eocene Wasatch and Wind River Formations, the Oligocene White River Formation, the Miocene Arikaree Formation, and the Pliocene Ogallala Formation. Capping all formations is a veneer of soil and Quaternary alluvium. In northern Converse County, Quaternary clinker deposits derived from natural burning of Paleocene and Eocene coalbeds lie at the surface.

Geologic Hazards

The primary geologic hazards in the planning area are earthquakes, landslides, and surface topography hazards (Map 3). Other potential hazards include flood-prone areas, radon, shrinking-swelling clay, selenium, windbown areas, and mine subsidence areas. The U.S. Geological Survey (USGS) and the Wyoming State Geological Survey (WSGS) monitor statewide earthquake events. The State of Wyoming has detected 28 earthquakes in the planning area since 1873. The latest earthquake occurred on February 1, 2003, and had an epicenter located 15 miles northeast of Casper in Natrona County, Wyoming. This

was the third recorded quake to occur on or near this site. Twelve earthquakes have occurred in Converse County, 4 in Goshen County, 11 in Natrona County, and 1 in Platte County. Most of the earthquake activity has occurred on active faults or along the north face of the Laramie Mountain Range, which may also be fault-related. No surface damage to the public surface or federal mineral estate is attributed to these known earthquakes.

Approximately 89,144 acres of high and 68,114 acres of moderate potential landslide area occur on public surface within the planning area. The USGS and the WSGS have mapped landslide areas. Shales within the Frontier Formation and Cody (Pierre) Shale provide an unstable foundation on which sliding can occur. The planning area has experienced a series of separate landslide events as observed in the field.

Activities in known geologic hazard areas are restricted on the public surface or federal mineral estate. The BLM addresses the management challenges associated with geologic hazards via the environmental analysis process for individual project proposals. When appropriate, the Casper Field Office develops mitigation measures to avoid and minimize impacts associated with geologic hazards. Hazards resulting from human activity are addressed in the Health and Safety section of this document.

Management actions for geologic resources address preserving unique geologic features within the planning area and reducing potential risks from known geologic hazards. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.1.3 Soil

Soils in the planning area are diverse and can vary substantially in terms of characteristics over relatively short distances. The distribution and occurrence of soils are dependent on many factors, including slope, geology, vegetation, climate, and time. General soils information for the planning area was obtained from the State Soil Geographic Database (STATSGO) (NRCS 1994), which was designed primarily for regional, multistate, river basin, state, and multicounty resource planning, management, and monitoring. STATSGO is intended to provide a general overview of soils distribution and occurrence in the planning area; it is not suitable for site-specific evaluations. For site-specific evaluations, detailed soils information should be obtained from published county soil surveys (NRCS 1971; NRCS 1983; NRCS 1997; NRCS 1994) or, the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS). More than 100 general soil map units are present in the area, which represent many unique soil series. However, only 11 map units comprise 40 percent of the soils in the planning area. Dominant soil textures are loams and sandy loams between 40 and 60 inches deep. These soils generally exhibit a low to moderate rate of runoff and wind erosion. In general, soils in the planning area are in good condition and capable of producing forage for wildlife and livestock, maintaining watershed integrity, and recovering from impacts associated with surface-disturbing activities.

Soil landscape position, steepness of slope, physical properties (including texture and structure), and chemical properties contribute to susceptibility to wind and water erosion. Soils in the planning area with a high wind or water erosion hazard have been identified where county soil survey data were available. On public surface within the planning area, approximately 185,815 acres of soils are highly susceptible to water erosion and 70,425 acres are highly susceptible to wind erosion. The areas highly susceptible to wind or water erosion potential soils for the planning area are displayed in Map 4 and summarized by ownership in Table 3-4.

The primary regional or national demand placed on soils in the planning area results from surface-disturbing activities. Extraction of minerals generally involves surface-disturbing activities including road building, well pad construction, pipeline installation, and vegetation treatments. Other actions that affect soils include a variety of surface uses that loosen topsoil and remove vegetation or other ground

cover, such as grazing and browsing by animals, off-highway vehicle (OHV) use, development of trails and campgrounds, ROW, fire-suppression activities, and the use of prescribed fire. Soil compaction resulting from surface-disturbing activities and associated development can reduce infiltration, increase runoff, and hamper reclamation.

Table 3-4. Soils with High Erosion Potential in the Casper Planning Area

Erosion Type	BLM Surface		Federal Minerals		All Land Ownership	
	Acres	Percent of Surface Estate	Acres	Percent of Mineral Estate	Acres	Percent of Lands within Planning Area
Wind	70,425	5	223,142	5	337,692	4
Water	185,815	14	352,636	8	459,681	5

Source: BLM 2005a
BLM Bureau of Land Management

There are designated sites in the planning area where soils require special management practices to limit erosion and loss of productivity. Currently, there are limits on surface development on Cedar Ridge due to erosive soils and fragile watershed conditions. Surface development is not permitted from December 30 to June 1 in specific areas, such as the South Fork Powder River drainage, Coal Mountain-Twin Buttes area, and Pine Mountain. Other management practices help protect soils in specially designated areas, including the Casper Sand Dunes and Salt Creek.

To address management challenges, management actions for soils generally address the following: identify and interpret existing soil resources and condition; utilize soil use limitation ratings for land use actions; prevent accelerated soil erosion from disturbed areas; utilize effective best management practices; establish successful reclamation on disturbed areas; manage activities to maintain or improve long-term soil productivity; and monitor, evaluate, and adapt management actions as needed. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.1.4 Water

This section characterizes surface water and groundwater resources and describes water use and current water management practices within the planning area.

Surface Water

The planning area lies within the Missouri River watershed. Map 5 shows the major streams and lakes in the planning area. The major tributary watersheds of the Missouri River include the following:

- The North Platte River flows into the planning area through Pathfinder Reservoir on the southern border of Natrona County and exits to the east at the Nebraska state line. The North Platte watershed encompasses the largest land area (66 percent) within the planning area and includes the following areas of interest for resource management: Bates Hole, Rattlesnake Hills, Laramie Range, Rawhide Buttes, and Goshen Hole.
- The Cheyenne River watershed comprises the headwaters of the Cheyenne River and tributaries located in northeast Natrona County and northern Converse County. About 16 percent of the planning area lies within this watershed.
- The Powder River watershed is located primarily in the northern half of Natrona County. It encompasses about 13 percent of the planning area.
- The Bighorn River watershed within the planning area primarily includes the area drained by Badwater and Poison Creeks (tributaries to the Wind River, which is tributary to the Bighorn

River). Located on the western edge of Natrona County, this drainage area comprises about 4 percent of the planning area.

- The Niobrara River watershed includes only a few square miles of drainage in northeastern Goshen County amounting to less than 1 percent of the total planning area.

Surface water quality and quantity is variable within the planning area. Relatively few perennial or intermittent stream segments exist on public lands compared to private and state lands. Most of the drainages on public lands are ephemeral. The Wyoming DEQ (2002b), in compliance with the federal Clean Water Act (CWA), requires that water quality be maintained or improved for outstanding (Class 1) and most of the high quality (Class 2) waters. The area managed by the Casper Field Office, located in the North Platte and Powder River watersheds, include Class 1 and Class 2 reaches. The Cheyenne, Wind, and Niobrara River watersheds each include some Class 2 stream segments. Water quality classes identified by the Wyoming DEQ do not correspond with Wyoming Game and Fish Department (WGFD) stream classes. See the Fish and Wildlife Resources – Fish section of this document for a description of WGFD stream classes. USGS (2005b) maintains streamflow statistics for streams within the planning area, as well as for streams nationwide.

The Wyoming DEQ permits all surface discharge of water, including produced water from CBNG development, through the (WYNPDES) permit process. WYNPDES permits require compliance with specific water quality standards which vary by stream class, and are periodically reviewed and revised for existing uses. The stream classes and water quality standards are defined (Wyoming DEQ 2002b), and a list of classified segments maintained by Wyoming DEQ is available (Wyoming DEQ 2001). Water discharged on the surface must be suitable for existing or planned uses, such as agricultural and livestock, and cannot result in a violation of water quality standards in the receiving stream. Discharges associated with CBNG production have been authorized in the North Platte River, Cheyenne River, and Powder River watersheds. In general, produced water from CBNG wells within the planning area can result in relatively high volumes of water compared with conventional natural gas wells, but not necessarily more than that associated with oil wells. The discharge water associated with current CBNG development, within the planning area, is of relatively high quality because it is derived from formations close to the recharge areas. This is not necessarily true of development deeper in the Powder River Basin to the north or from potential deeper development within the Wind River Basin. Produced water disposal options are highly dependent on water quality and economics (BLM 2002c). Produced water with high salinity levels are not be considered for surface discharge and are most likely disposed of through injection. Produced water from conventional oil and gas wells discharged in the vicinity of Midwest in Natrona County has much higher salinity because it is derived from aquifers that are typically more saline than those associated with the development of CBNG. BLM's policy on land application disposal does not allow disposal of produced water on public lands using surface disposal methods, such as irrigation (BLM 2005d).

Watershed conditions impact the effective life (and associated costs) of water development projects, such as reservoirs and spring developments. The development and use of resources that require surface disturbance, such as minerals development, livestock grazing, forestry, OHV use, and recreation, can impact surface water quality, primarily by increasing sediment loads. Streambank degradation and erosion, as well as upland sheet, rill, and gully erosion within the watersheds, are the predominant sources of sediment found in streams. Historic construction activities, unsurfaced roads, and some development activities have contributed to streambank degradation and erosion in the planning area. Proper management of grazing, road construction, forestry, oil and gas activity, mining, recreation, and proper application of mitigation measures identified in site-specific management or development plans can minimize sediment delivery within the planning area that might otherwise result from these activities. The use of pesticides, fertilizers, and other chemicals near streams and drainageways can affect surface

water quality if the chemicals drift in the wind or are transported by surface water runoff into water bodies. Proper implementation of mitigation measures can minimize or eliminate these sources of water pollution.

Groundwater Quality

Groundwater resources within the planning area occur in geologic formations (ranging from the Precambrian to the Holocene in age) that are exposed at points; most are known to yield some water to wells and springs. The major regional aquifers of the planning area are the High Plains aquifer and the Northern Great Plains aquifer. The High Plains aquifer is mostly alluvial, relatively shallow and thick, permeable, and generally productive for wells. The Northern Great Plains aquifer occurs primarily within the Powder River Basin in the planning area, and comprises a variety of formations, some of which are carbonate rocks that provide high-yielding aquifers and some confined formations that provide artesian wells. Discharges to small streams or springs at outcrops occur in some areas (USGS 1996). Groundwater recharge occurs primarily from direct infiltration of precipitation into the shallower aquifers from infiltration into the rock outcrop areas of the deeper aquifers and leakage between aquifers. Groundwater quality depends primarily on the source geologic formation or aquifer.

Groundwater is used to meet the demand of current uses on public land, such as livestock, wildlife, mineral development, and recreation. Groundwater sources are adequate to meet the demands of all current uses on public land. New development and increased water use by resources such as minerals, range, forestry, and recreation may affect groundwater quality.

Groundwater quality trends can be estimated by identifying the locations and characteristics of the areas most vulnerable to contamination. In the four counties of the planning area, areas that are highly vulnerable to groundwater contamination are located along the alluvial floodplains of the major rivers. The vulnerable areas contain high water tables, sandy soils, and high hydraulic conductivity rates that create suitable conditions for contaminant leaching from the surface into the groundwater. Approximately 1 percent of Converse County is considered to contain groundwater highly vulnerable to contamination. Approximately 2 percent of Natrona County, 8 percent of Platte County, and 13 percent of Goshen County contain areas with high groundwater vulnerability (Wyoming Geographic Information Science Center 1998).

Surface and Groundwater Quantity and Use

Both surface water and groundwater are used as water sources within the planning area. Surface water sources typically are adequate to meet existing uses on public lands, but natural climatic fluctuations, such as drought, can make marginally adequate sources unreliable.

As of February 2006, there were more than 21,000 active water wells permitted through the Wyoming State Engineer's Office within the four counties of the planning area (WSEO 2006). Table 3-5 shows a summary of the uses within each county. Table 3-6 summarizes water use as of the year 2000 for Converse, Goshen, Natrona, and Platte counties.

Table 3-5. Uses of Active Well Permits by County

County	Use	Number of Active Permits
Converse	Coalbed natural gas	166
	Domestic	1,175
	Domestic, stock	778
	Industrial	220
	Irrigation	46
	Miscellaneous	187
	Monitoring	1,643
	Municipal	15
	Stock	1,787
	Test well	9
Goshen	Domestic	751
	Domestic, stock	1,547
	Industrial	20
	Irrigation	683
	Miscellaneous	145
	Monitoring	209
	Municipal	32
	Stock	1,700
	Test well	41
Natrona	Coalbed natural gas	2
	Domestic	2,045
	Domestic, stock	933
	Industrial	46
	Irrigation	117
	Miscellaneous	370
	Monitoring	1,731
	Municipal	55
	Reservoir supply	7
	Stock	965
	Test well	25
Platte	Domestic	692
	Domestic, stock	949
	Irrigation	386
	Miscellaneous	134
	Monitoring	202
	Municipal	18
	Stock	1,242
	Test well	36

Source: WSEO 2006

Table 3-6. Water Use Summary for the Year 2000 for Counties Encompassing the Casper Planning Area

Water Use	Groundwater (Million gallons/day)	Surface Water (Million gallons/day)
Public Supply (municipal)	15.5	3.9
Domestic	1.4	0.0
Commercial (thermoelectric)	0.0	204.7
Industrial (includes mining)	56.8	5.1
Irrigation (withdrawal)	143.9	869.7

Source: USGS 2004

Within the planning area, the BLM has approximately 900 springs (of which less than 100 are developed) and approximately 125 wells. Water is used primarily for agricultural, commercial, municipal, and industrial purposes within the planning area. Water-based recreation and use by fish and wildlife also are prevalent. Agricultural uses consist primarily of livestock watering and irrigation for forage production for the livestock industry. Recent court decisions have established water allocations within the North Platte River watershed that define the allowable use of water within the North Platte River drainage in the planning area (WSEO 2001).

Control and allocation of water within the boundaries of the planning area are primarily the responsibilities of the Wyoming State Engineer's Office, which administers all waters of the state, and the U.S. Bureau of Reclamation (USBR), which manages dam and reservoir systems along the North Platte River. The BLM is responsible for the management of public surface and federal mineral estate in a manner that maintains or enhances water quality and quantity for other uses. Other administering agencies include the Wyoming Board of Control and the Wyoming DEQ.

The BLM has developed various types of water resource plans and stipulations to manage water resources. For example, watershed plans are commonly used to address degradation of specific streams and other riparian resources. The Casper Field Office's Watershed and Water Resources Program conducts data collection, resource monitoring, and analysis in support of other management activities, such as range management, forest management, and mineral extraction. In addition, water resource protection plans and stipulations can be used to protect surface water resources, such as streams, lakes, reservoirs; and groundwater resources, such as wells and springs. Other water management plans can address especially fragile areas in specific locations and water resources with special designations.

Management actions for water resources generally address water quality management, water conservation, impacts from other BLM resource program authorized activities, human-induced-nonpoint source pollution, maintenance or improvement of all streams to designated state classification levels, and improvement of watershed conditions. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.2 Mineral Resources

Mineral resources in the planning area include locatable, leasable (coal, geothermal, oil and gas, other solid leasables), and salable minerals. Each individual resource section below includes a definition and description of the resource, the current condition of the resource, management challenges, and management actions.

3.2.1 Locatable

The General Mining Law of 1872, as amended, allows the location and maintenance of mining claims on those federal mineral estate lands open for mining claim location and patent. Potentially locatable metallic (gold, silver, lead, platinum, copper, uranium, and chromite), and nonmetallic (talc, mica, white marble, building stone, fluorspar, chemical-grade limestone, gypsum, and bentonite) minerals exist in the planning area. Precious and semiprecious stones that exist or potentially exist include jade, diamond, iolite, ruby, sapphire, helidor beryl, and kyanite. The BLM considers common varieties of sand, gravel, stone (e.g., decorative stone, limestone, and gypsum), clay (e.g., shale and bentonite), limestone aggregate, borrow material, clinker (scoria), and leonardite (weathered coals), to be salable and addresses them in the Salable Minerals section.

The 12 permitted mining operations on federal mineral estate include uranium (five mines in Natrona and Converse counties), chemical-grade limestone (Bass and Brush Creek quarries in Platte County), marble (White Marble and Silvergreen quarries in Platte County), bentonite (two mines in Natrona County), and jade (Lone Tree Mine in Natrona County). Converse County with 3,954 claims has most of the 5,766 active claims (as of February 2006). Natrona County has 1,972, Platte County has 45, and Goshen County has 16. In FY 2004, claimants filed 6 notices and 18 plans of operation to work on their claims.

The discovery of uranium in Wyoming was made first in 1949. Mining of uranium found in sedimentary rocks of the Powder River, Wind River, and Shirley basins began in the 1950s. In the 1980s *in-situ* leaching began to take the place of conventional mining as the preferred method for recovering uranium. The last conventional mine or mill operation closed in 1992. There are two active *in-situ* leaching operations (CAMECO's Highland/Morton Ranch and Smith Ranch Operations) in the planning area with a combined production of 1,323,530 pounds of uranium oxide (yellowcake) in 2004. Numerous mining claims for uranium have recently been staked due to the threefold increase in the price of yellowcake.

Bentonite, a sodium montmorillonite clay, is a major component of drilling mud. It has numerous other uses, and can be found in foundry molds, pet litter, and geotextile liners for landfills and water impoundments. Most bentonite production in the planning area is from east central Natrona County. Reported production in 2002 was 653,738 tons of bentonite, almost 20 percent of the total 3,454,582 tons produced in Wyoming that year (BLM 2004c).

Gold deposits have been identified in the Rattlesnake Hills portion of the planning area. Historically, copper deposits have been mined in the Hartville Uplift near Geurnsey, Casper Mountain, South Bighorn Mountains, and the Deer Creek Copper District and La Prele in Converse County. Chromite was mined in the northern Laramie Mountains and iron in the Hartville Uplift. All these operations are now abandoned. Additional information on these and other locatable minerals can be found in the Mineral Occurrence and Development Potential Report (BLM 2004c).

The BLM manages the Mining Law program on the federal mineral estate, including Stock Raising Homestead lands when the claimant does not receive written consent from the surface owner. Such management includes authorizing and permitting mineral exploration, mining, and reclamation actions. For operations other than casual use, the claimant is required to submit a notice or a plan of operations. Regulations require the claimant to prevent unnecessary or undue degradation of the land.

Management actions may recommend closures to mineral entry by withdrawing areas from further location of mining claims or sites and may apply restrictions needed to protect other resource values when conducting activities under the operation of the mining laws (Map 13). Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.2.2 Leasable – Coal

The coal-bearing formations in the Southern Powder River Basin Field are the Wasatch, Fort Union, and Lance formations. The Wyodak-Anderson zone is the main producing coal zone and includes the Canyon, Anderson, Wyodak, and Big George splits. North of the planning area the coal zone is a single bed, but splits into two beds in the planning area—the upper Anderson and lower Canyon splits (BLM 2004c).

Wyoming produces approximately one-third of all coal produced in the United States. The Powder River Basin, which extends into the planning area in northern Converse County, contains some of the largest low-sulfur coal deposits in the world. The Powder River Basin Coal Review (BLM 2006b) discusses coal activities in the Powder River Basin. Two other coal fields, the Goshen Hole Coal Field of the Denver Basin and the Wind River Coal Field of the Wind River Basin, also extend into the planning area; however, neither of these is currently producing in the planning area (BLM 2004c).

Coal production began in the planning area in 1883 near the towns of Glenrock and Douglas in south central Converse County. Prior to closure in 2000, the Dave Johnston mine produced an annual average of 2.4-million tons of coal over 43 years with a peak production of 4.1-million tons in 1997. This mine is now undergoing reclamation. Further north, on the Converse-Campbell county line, the Antelope Mine began production in 1986. Production from this mine has increased steadily; however, the New Source Review Air Quality permit limits production to 32.58-million tons per year (Wyoming DEQ 2003). In 2004, the mine produced 29.7-million tons of coal (BLM 2004c).

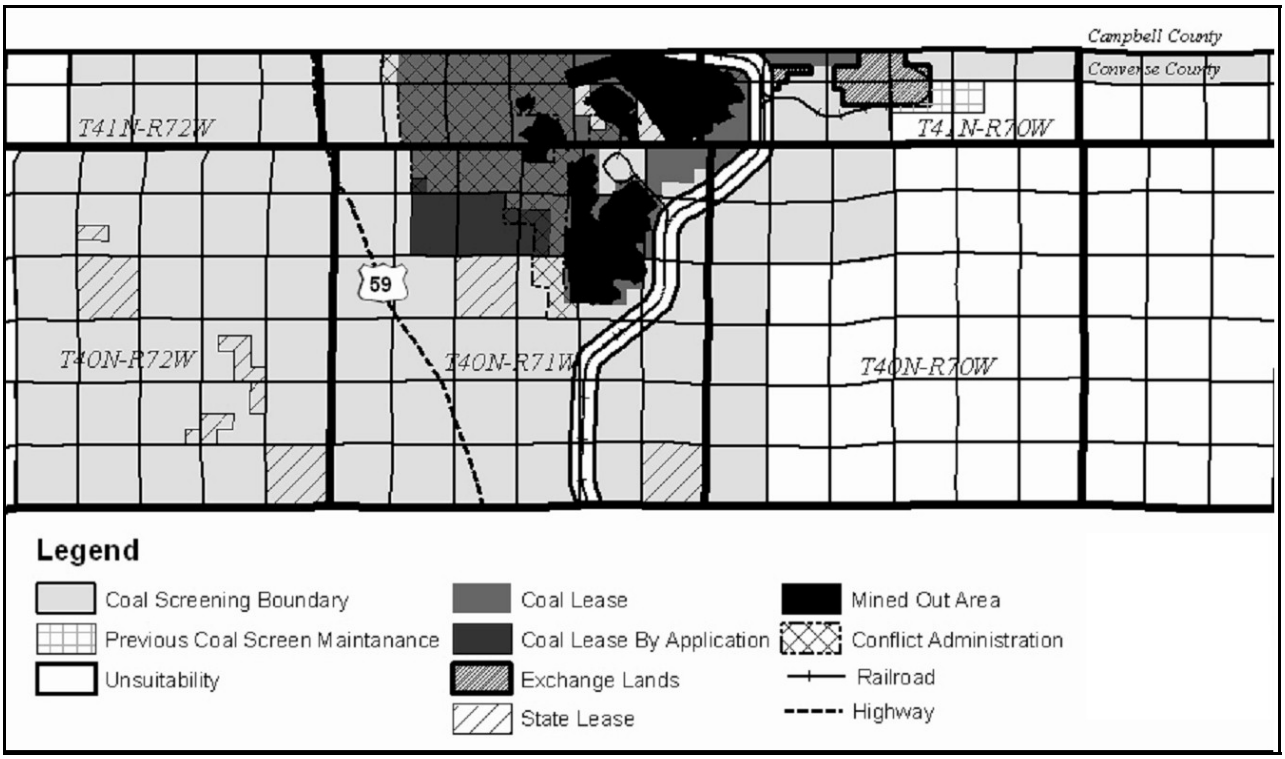
Coal exploration is allowed on all federal mineral estate lands in the planning area. Exploration on federal mineral estate lands is subject to the requirements and conditions of the coal exploration license process, the result being a set of project-specific stipulations and conditions designed to limit impacts from exploration on other resources. Before the area can be considered for leasing, the amount of overburden, volume and quality of coal, and other information needed to plan a mine must be gathered. The Casper Solid Minerals Group (CSMG) has the primary responsibility for all coal operations within the Wyoming Powder River Basin (including inspection and enforcement) on federal lands.

The entire coal development production area falls within the Thunder Basin National Grassland and is jointly managed by the BLM and the USFS. Two recently issued leases include acreage in the planning area. One is a 3,542-acre extension of the Antelope Mine. The lease for the West Antelope Lease by Application (LBA) extension was issued with an effective date of February 1, 2005. The second lease is an extension of the North Antelope/Rochelle Mine (NARO) complex covering 4,503 acres, a portion of which extends into Converse County (BLM 2004c). The applicant successfully aquired the NARO South LBA and a lease was issued effective September 1, 2004. A new LBA was received in April 2005 proposing to add acreage to the Antelope Mine. An additional area adjacent to the NARO South LBA is under consideration as a potential exchange tract and may add additional mining reserves within Converse County (refer to Figure 3-5). Approximately 59,694 acres have been found acceptable for further consideration for coal leasing as a result of previously applied land use planning screens in 43 Code of Federal Regulations (CFR) 3420.1-4. Table 3-7 identifies mined and unmined leasable coal areas. Table 3-8 displays coal development potential for northern Converse County.

Management challenges for the coal program include conflict resolution between resource programs (e.g., oil and gas leases vs. coal leases) and complying with restrictions imposed by other resource programs (e.g., wildlife stipulations). In addition, health and safety issues, including landslides and soil and groundwater contamination, present management challenges.

Management actions for coal generally define areas acceptable for further consideration for leasing. Restrictions on coal result from management actions identified in other resource programs. These management actions are incorporated in the alternatives and described in more detail in Chapter 2.

Figure 3-5. Coal Development Potential Area in Northern Converse County



Source: BLM 2001a

Table 3-7. Mined and Unmined Leasable Coal Areas (acres)

	Leased	Unmined	Mined/No Coal
Federal Coal	8,655	3,502	5,153
Lease by Application	1,353	1,353	-
Exchange Area	822	822	-
State Coal	807	59	748
Total	11,637	5,736	5,901

Source: Wright 2005

Table 3-8. Coal Development Potential for Northern Converse County (acres)

2001 Screening[1]	Acres
Federal coal with development potential	61,960
Areas deleted by unsuitability criteria	2,266
Areas deleted due to multiple use conflicts	0
Areas deleted by surface owner consultation	0
Areas of Federal coal acceptable for further consideration for leasing[2]	59,694
Conflict Administration Zone	
Coal and coalbed natural gas conflict area	5,056

[1]Scoping for the RMP revision did not identify the need for additional screening.
[2]Subsequent to 2001, 5,901acres were leased and mined, leaving 53,793 acres or 6 Billion tons of coal acceptable for further consideration for leasing
Source: BLM 2006c

3.2.3 Leasable – Geothermal

Geothermal resources found on federal mineral estate are considered leasable minerals. As such, the same laws and regulations governing other leasable minerals cover exploration and development of these resources. Use of low temperature geothermal resources is most common in warm-water heating systems in homes and businesses. Although not yet widespread, low temperature geothermal use is increasing as prices for other types of energy increase.

There are three areas of natural thermal springs in the planning area—the Alcova Hot Springs in southern Natrona County (now under Alcova Reservoir), the Douglas Warm Spring south of the town of Douglas in southeastern Converse County, and Immigrants Washtub in east central Platte County. A bathing facility constructed in 1961 near the Douglas Warm Spring is the only commercial use of thermal waters (BLM 2004c). In addition, the BLM has authorized a thermal water well and associated pond under the Recreation and Public Purposes (R&PP) Act in the Salt Creek area for year-round scuba diving use.

In 1970, Congress passed the Geothermal Steam Act (Public Law 91-581, as amended [30 U.S.C. § 1001 et seq.]). Since that time, several studies have been conducted to assess geothermal resources in Wyoming. The draft Reasonable Foreseeable Development (RFD) (BLM 2005e) document for geothermal development contains more information on these studies. None of the studies identified geothermal resources within the planning area with sufficiently high temperatures to produce steam to generate electricity. Some studies identified several areas of anomalously high geothermal gradients with the potential for producing hot water for direct use.

Due to the increasing costs of energy, geothermal resources in the planning area could be increasingly leased for home heating or electrical power generation. Restrictions on energy development generally result from management actions identified in other resource programs. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.2.4 Leasable – Oil and Gas

Oil and gas exploration and development are important industries in the planning area. Activity began in the 1880s in the Salt Creek area of the Powder River Basin and has continued to grow across the planning area as the country's demand for oil and gas increases.

In simplest terms, oil and gas are most often found in the pore spaces of sedimentary rocks, such as sandstone and limestone, having migrated there from source rocks, like marine shales, rich in organic

material. When rocks containing this organic material are subjected to heat and pressure, the organic compounds break down over time, resulting in oil and natural gas. As the oil and gas are generated, they migrate through the pore spaces of the rock or along fractures until they encounter a structural or stratigraphic trap with an impermeable seal. In the planning area, these conditions are associated with four sedimentary basins and the Casper Arch. The sedimentary basins include the Powder River, Wind River, Denver-Julesburg, and Shirley basins, of which portions of each underlie the planning area. Of the four basins, the Powder River and Wind River basins are the most prolific in the planning area while production from the planning area portions of the Shirley and Denver-Julesburg basins are negligible. Another mode of occurrence for natural gas is CBNG, where the gas is trapped in the coal where it was generated. A well-known hazard in coal mines, CBNG has become economically important with some of the largest reserves found in the Powder River Basin. The Mineral Occurrence and Development Potential Report (BLM 2004c) contains a more detailed explanation of these processes. Table 3-9 lists important oil and gas producing formations in the Denver-Cheyenne, Powder River, and Wind River basins (BLM 2005f).

Geophysical exploration is a tool of the oil and gas industry that bounces shock waves off subsurface rock layers to determine their thickness and geometry. Shock waves are produced by an energy source and instruments record the waves when they return to the surface. The energy typically comes from the detonation of explosives in a shallow drill hole or from a heavy weight either dropped or vibrated on the ground surface. Sensors pick up the resulting shock waves through a line of sensors, or geophones, connected to a recording truck. Seismic operations use existing roads when feasible, but also require off-road travel. For additional information about how geophysical exploration is conducted, refer to Appendix D.

There are generally two kinds of seismic surveys, two-dimensional (2-D) and three-dimensional (3-D). The 2-D surveys are single or multiple linear lines with their receivers and source points in the same line extending up to several miles in length, whereas 3-D surveys are conducted over a grid pattern and their source lines and receiver lines are separate. According to the RFD scenario for oil and gas (BLM 2005f), the Casper Field Office approved 15 2-D and 17 3-D projects between 1995 and 2003, with 3-D projects comprising most of the activity since 1999. This trend and level of activity is expected to continue throughout the planning period.

The BLM is responsible for authorizing and administering geophysical exploration operations on all public surface lands within the planning area, while the Wyoming Oil and Gas Conservation Commission (WOGCC) is responsible for authorizing all operations on state and private surface land. The BLM authorizes geophysical exploration under a federal oil and gas lease via Sundry Notice approval. At the leasing stage, the CFO applies appropriate stipulations on federal oil and gas leases, including standard oil and gas stipulations (see Appendix N), as well as special stipulations identified in the Resource Management Plan (RMP).

Leasing procedures for oil and gas, including CBNG, are the same. Based on the federal Onshore Oil and Gas Leasing Reform Act of 1987, all parcels must be exposed to competitive interests. Lands that do not receive competitive interest are available for noncompetitive leasing for a period not to exceed 2 years. The BLM holds competitive sales six times a year by oral auction and issues competitive and noncompetitive leases for a term of 10 years. If the lessee establishes hydrocarbon production, the competitive and noncompetitive leases can be held for as long as oil or gas is produced. The federal government receives yearly rental fees on nonproducing leases. The State of Wyoming also receives half of all money generated from the sale and rental of oil and gas leases. Royalty on production is received on producing leases, one-half of which is returned to the State of Wyoming. According to the RFD scenario for oil and gas (BLM 2005f), approximately 1.74-million acres of federal land in the planning area is covered by oil and gas leases.

Table 3-9. Oil and Gas Producing Formations in the Casper Planning Area

Age	Denver-Cheyenne Basin	Powder River Basin	Wind River Basin	Comments
Paleocene	–	Fort Union Formation	Fort Union Formation	Primary source of CBNG
Upper Cretaceous	–	–	Lance Formation	Major gas production in the Wind River Basin
	–	Lewis Shale	–	Minor production from Teckla Sandstone Member
	–	Mesaverde Formation	Mesaverde Formation	Minor production from Teapot Sandstone and Parkman Sandstone Members
	Codell Sandstone	–	–	–
	–	Frontier Formation	–	Major production from Wall Creek and "2nd Wall Creek Sand"
	–	Mowry Shale	–	Minor production
Lower Cretaceous	Muddy (J) Sandstone	Muddy/Newcastle Sandstone	Muddy Formation	Major production in the Powder River and Wind River basins
	–	Fall River (Dakota) Formation	Part of Inyan Kara Group	Major production in Powder River Basin
	–	Lakota Formation	–	
Jurassic	–	Sundance Formation	–	Minor production
Permian	–	Goose Egg Formation	–	Minor production from Minnekahta Limestone Member
Pennsylvanian	–	Minnelusa Formation (Tensleep and Amsden formations in western portion of basin)	Tensleep Formation	Major production in Powder River Basin

Source: BLM 2005f
- none identified
CBNG coalbed natural gas

After acquiring an oil and gas lease, and prior to development, an application for permit to drill (APD) must be filed with the WOGCC and the BLM Casper Field Office if the well is located on a federal oil and gas lease in the planning area. Within the planning area, Natrona County has the largest number of APDs filed with a total of 8,508 as of mid-February 2005, followed by Converse County with 4,357 applications filed, Goshen County with 249 filings, and Platte County with 97 applications filed since the WOGCC began keeping records (WOGCC 2005). Table 3-10 provides well statistics for the planning area. After the BLM approves the permit, the company may proceed with drilling in accordance with the conditions of the permit's approval.

Table 3-10. Well Statistics for Casper Planning Area as of February 24, 2005

County	Federal	State or Fee	Total
Natrona County			
Total APDs filed	7,331	1,177	8,508
APDs waiting on approval	4	0	4
Total APDs issued	7,327	1,177	8,504
Number of permits expired	186	29	215
Total number of active permits	7,141	1,148	8,289
Number of permits to drill	48	7	55
Number of wells drilling (spuds)	197	42	239
Current activity level	245	49	294
Number of completed (producing) wells	2,450	217	2,667
Number of monitoring wells	4	0	4
Number of dormant (shut-in) wells	105	29	134
Number of intents to abandon	72	13	85
Number of plugged and abandoned wells	4,265	840	5,105
Total wells drilled	6,896	1,099	7,995
Converse County			
Total APDs filed	1,853	2,504	4,357
APDs waiting on approval	7	1	8
Total APDs issued	1,846	2,503	4,349
Number of permits expired	127	141	268
Total number of active permits	1,719	2,362	4,081
Number of permits to drill	86	10	96
Number of wells drilling (spuds)	24	19	43
Current activity level	110	29	139
Number of completed (producing) wells	589	606	1,195
Number of monitoring wells	0	1	1
Number of dormant (shut-in) wells	26	50	76
Number of intents to abandon	17	24	41
Number of plugged and abandoned wells	977	1652	2629
Total wells drilled	1,609	2,333	3,942
Goshen County			
Total APDs filed	40	209	249
APDs waiting on approval	0	0	0
Total APDs issued	40	209	249
Number of permits expired	0	0	0
Total number of active permits	40	209	249

Table 3-10. Well Statistics for Casper Planning Area as of February 24, 2005 (Continued)

County	Federal	State or Fee	Total
Number of permits to drill	0	0	0
Number of wells drilling (spuds)	0	1	1
Current activity level	0	1	1
Number of completed (producing) wells	1	0	1
Number of monitoring wells	0	0	0
Number of dormant (shut-in) wells	0	0	0
Number of intents to abandon	0	0	0
Number of plugged and abandoned wells	39	208	247
Total wells drilled	40	208	248
Platte County			
Total APDs filed	12	85	97
APDs waiting on approval	0	0	0
Total APDs issued	12	85	97
Number of permits expired	0	1	1
Total number of active permits	12	84	96
Number of permits to drill	0	0	0
Number of wells drilling (spuds)	0	1	1
Current activity level	0	1	1
Number of completed (producing) wells	0	0	0
Number of monitoring wells	0	0	0
Number of dormant (shut-in) wells	0	1	1
Number of intents to abandon	0	2	2
Number of plugged and abandoned wells	12	80	92
Total wells drilled	12	83	95

Source: WOGCC 2005

APD Application for Permit to Drill

One-hundred seventy oil and gas fields have been found and named within the planning area. At the end of 2004, 119 of these fields were still producing. Table 3-11 lists currently producing oil and gas fields, wholly or partially, within the planning area by basin and their production for 2004 (WOGCC 2005). No production occurred in the planning area portion of Shirley Basin in 2004.

Table 3-11. Field Statistics for Oil and Gas Production in the Casper Planning Area during 2004

Field	Oil (bbls)	Gas (mcf)	Water (bbls)
Wyoming Oil And Gas Conservation Commission—Powder River Basin			
Report Date 02/24/05 **Production for Year 2004** **Based On Oil Production**			
African Swallow	34,917	1,028,849	3,831
Allemand	2,557	23,081	0
Avery Draw	3,614	84,676	245
Bear Creek	2,578	29,987	0
Big Muddy	20,387	39	208,725
Big Muddy East	5	0	0
Blizzard	3,526	4,005	1,110
Blue Hill	4,571	2,056	204
Bobcat Creek	5,005	2,645	149
Bower	26,425	58,021	83,355
Box Creek	1,191	0	0
Brooks Draw	16,331	16,682	0
Brooks Ranch	9,168	0	5,179
Brush Creek	14,716	18,714	349
Buck Draw	3,124	27,819	93
Buck Draw East	129	4,957	0
Burke Ranch	626	0	223
Burke Ranch East	13,662	210	116,774
Carter	1,379	0	0
Casper Creek North	6,340	0	832,582
Cole Creek	36,304	8,162	201,525
Cole Creek South	25,050	0	1,384,927
Cole Northeast	6,586	19,302	637
Corney	3,074	2,872	4,351
Crawford Draw	27,550	417,272	257
Deer Creek	724	0	0
Dennell Draw	515	0	0
Derrick Draw	70,549	2,757,891	2,444
Dilts	3,294	3,857	1,674
Don Draw	2,433	486	505
Douglas South	2,126	0	0
Dry Fork	9,637	22	12,924
Dull	273	0	0
Fetter	2,772	43,049	234
Finley Draw	9,338	126,802	1,340
Flat Top	15,129	264,622	7,050
Flat Top East	188	0	0
Frog Creek	10,149	73,056	0
Geary Dome	2,721	0	9,602
Geary North	387	75	103
Gibson Draw	10,760	46,920	317
Glenrock	7,611	0	24,268
Glenrock South	63,400	0	3,480,409
Haps Draw	510	0	0
Hornbuckle	91,424	15,116	1,033
Horse Ranch	8,596	0	1,940,866
Kaye	105,026	14,402	60,536
Lebar	563	0	84
Manning	16,652	20,898	36,843
Martin Springs	7,109	0	16,200
Mary Draw	3,055	75,409	195
Midway	1,457	0	744
Mikes Draw	112,393	60,864	84,443

Table 3-11. Field Statistics for Oil and Gas Production in the Casper Planning Area during 2004 (Continued)

Field	Oil (bbls)	Gas (mcf)	Water (bbls)
Moore	2,183	47,231	620
Morton	4,218	3,855	10
Ninemile	1,435	3,782	0
Nutcracker	4,413	32,743	1,186
Ogalalla Hills	2,448	13,080	0
Ormsby Road	506	0	0
Orpha	6,194	1,369	432
Phillips Creek	15,214	84,448	70
Pine Tree	100,383	383,243	6,590
Piney Creek	7,372	0	0
Poison Draw	32,321	5,521	210
Popskull	9,504	4,092	0
Powell	132,130	3,377,571	38,817
Rawles	0	0	0
Ross (009)	2,786	5,316	99
Sage Spring Creek	65,786	21,070	817,374
Salt Creek	1,588,285	731,650	197,134,657
Salt Creek East	69,935	72,604	1,915,757
Salt Creek West	3,140	564	482
Sand Creek North	4,195	603	0
Sand Dunes	79,388	5,931,728	4,490
School Creek	27,154	466,354	1,183
Scott	293,475	722,323	145,194
Shawnee	5,300	4,779	1,639
Smoky Gap	4,064	12	0
Snake Charmer Draw	160,130	230,313	4,640
Soda Lake	731	0	498
Spearhead Ranch	87,676	280,712	2,782
Steinle Ranch	4,426	183,947	1,248
Taylor	8,314	79,163	648
Teapot East	13,015	0	31,342
Teapot Naval Reserve	171,336	864,573	14,831,940
Tick	1,129	0	0
Tisdale East	10,071	0	425,771
Twenty-Mile Hill	5,372	0	0
V-Two Draw	5,785	0	39
Well Draw	189,976	748,015	199,901
Total Production	3,649,703	18,827,301	223,948,745
Wyoming Oil And Gas Conservation Commission—Wind River Basin			
Report Date 02/24/05 **Production for Year 2004** **Based On Oil Production**			
Austin Creek	46,569	742,654	620
Bates Creek	309	0	94
Boone Dome	3,385	249,747	303
Burnt Wagon	112	10	0
Canal	6,011	12,022	0
Casper Creek South	113,962	0	12,632,125
Clark Ranch	17,721	3,613	740,595
Cooper Reservoir	25,730	4,741,313	229,237
Emerald	14,704	0	747,843
Frenchie Draw	311,465	8,419,443	2,840,876
Government Bridge	16,886	2,265	5,761
Grieve	6,882	2,295	496,261
Grieve North	930	373,037	0
Iron Creek	5,524	33	137,930
Lost Dome	107,579	0	2,406,723
Madden	91,344	138,934,332	4,067,726

Table 3-11. Field Statistics for Oil and Gas Production in the Casper Planning Area during 2004 (Continued)

Field	Oil (bbls)	Gas (mcf)	Water (bbls)
Notches Dome	176,487	0	28,652,404
Oil Mountain	11,326	0	104,538
Okie Draw	32	0	0
Pine Mountain	4,701	0	0
Poison Spider	35,902	0	577,362
Poison Spider West	26,809	136,769	36,915
Poison Spring Creek	1,647	1,471	202
Raderville	9,008	2,698	1,917
Saddle Rock	4,954	628,178	1,549
Schrader Flats	46	0	4,500
Squaw Butte	3,804	14,066	1,761
Sun Ranch	1,152	129,106	196
Tepee Flats	0	9,253	28
Tipps	2,225	160	1,332
Wallace Creek	51,876	3,747,113	21,762
Waltman (Cave Gulch)	112,930	21,581,115	487,152
Total Production	1,034,373	179,601,587	25,545,112
Wyoming Oil And Gas Conservation Commission—Denver-Cheyenne Basin			
Report Date 02/24/05 **Production for Year 2004** **Based On Oil Production**			
Torrington	6	0	0
Total Production	6	0	0

Source: WOGCC 2005

bbl barrel
mcf thousand cubic feet

Oil and gas reserves, both proven and potential, can be evaluated using different methods and assumptions. With the continuing increase in demand, a number of studies identify where and how much oil and gas remains to develop. The most comprehensive of these studies, completed by USGS in 1996, looked at potential onshore oil and gas reserves in the United States. Other studies, completed since the USGS study, focus on a particular geographic region or basin. The RFD scenario for oil and gas (BLM 2005f) describes studies pertaining to the planning area, including their assumptions and results. Table 3-12 is a distillation of the RFD discussion, showing the range of estimates made for oil and gas reserves in the planning area.

CBNG is one of the largest contributors to total natural gas production in Wyoming, and coals of the Powder River Basin are the largest source of CBNG. Of the 336 billion cube feet (Bcf) of natural gas produced in the Powder River Basin in 2004, 298 Bcf (almost 89 percent), was CBNG. Development of CBNG resources in the planning area is limited, with 6 wells completed on federal land and 33 completed on state or fee (private) land (WOGCC 2005).

The oil and gas industry impacts the economy of the planning area. Employment and income follow the drilling and production cycle, which follows the prices for oil and gas. These relationships are discussed in more detail in the Socioeconomic Resources section. The baseline unconstrained RFD scenario for oil and gas projects approximately 2,800 conventional, deep, and CBNG wells (1,988 federal and 812 state and fee) to be developed in the planning area between 2001 and 2020. Similarly, the unconstrained RFD projects 700 wells (497 federal and 203 state and fee) drilled for CBNG in the planning area by 2020 as this resource is developed (BLM 2005f).

Table 3-12. Summary of Oil and Gas Reserve Estimates for the Casper Planning Area

	Gas – Bcf	Oil – MMB	NGL – MMB
Estimated Gas Reserves in Place			
Powder River Basin CBNG	5,850	-	-
Wind River Basin CBNG	1,380	-	-
D-C Basin CBNG	130	-	-
Wind River Basin Conventional	228,850	-	-
Wind River Basin Conventional <15,000 feet	268,870	-	-
Wind River Basin Conventional >15,000 feet	1,380	-	-
Proved Oil and Gas Reserves			
Powder River Basin Conventional	430	34.7	-
Wind River Basin Conventional	575	20.0	-
D-C Basin Conventional	0	0.62	-
Estimated Potential Reserves			
Powder River Basin All	2,681	345.2	23.3
Powder River Basin Conventional <15,000 feet	770	-	-
Powder River Basin Conventional >15,000 feet	180	-	-
Wind River Basin All	268	39.6	2.5
Wind River Basin Economically recoverable	7,390	-	-
Wind River Basin Technically recoverable	28,060	-	-
Wind River Basin Conventional <15,000 feet	1,550	-	-
Wind River Basin Conventional >15,000 feet	1,150	-	-
Wind River Basin CBNG	564	-	-
D-C Basin All	4.23	3.96	1.34
D-C Basin Conventional <15,000 feet	109	-	-

Source: BLM 2005f

>	greater than
<	less than
Bcf	billion cubic feet
CBNG	coalbed natural gas
D-C Basin	Denver-Cheyenne Basin
MMB	million barrels
NGL	natural gas liquids

Management challenges for the oil and gas program include conflict resolution between resource programs (e.g., oil and gas leases vs. coal leases), split-estate issues, and restrictions imposed by other resource programs (e.g., wildlife stipulations).

Management actions for oil and gas generally address those areas open and/or closed to leasing. Restrictions on oil and gas development result from management actions identified in other resource programs. These management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.2.5 Leasable – Other Solid Leasables

Other leasable minerals include sodium (trona), phosphates, and oil shale. Uranium, bentonite, gypsum, limestone, and other "hardrock minerals" occurring on acquired public lands that are not closed to mineral leasing, can be developed only under a leasing system. Access to the federal leasable mineral estate is at the BLM's discretion.

The United States Bureau of Mines (USBM 1993) recognized the occurrence of sodium- and phosphate-bearing rocks in small parts of the planning area. Some production of sodium has occurred in the past, but is not being produced at this time.

The United States Bureau of Mines (USBM 1993) recognized the occurrence of relatively large areas of uranium-, bentonite-, gypsum-, and limestone-bearing rocks within the planning area. They also identified smaller areas of other "hardrock minerals." In the past, the BLM has issued leases for uranium and bentonite on acquired lands in the planning area. At present, there are no active leases. Recent uranium price increases now cause producers to pay severance tax. Increasing prices could lead to additional future uranium leasing. *In-situ* mining is the mostly likely method of recovering uranium. If water quality is affected by any mining that generates tailings piles, the BLM requires remediation. Although bentonite-, gypsum-, and limestone-bearing rocks cover relatively large areas, their intersection with acquired lands (which cover relatively small isolated areas within the planning area) is limited and, thus, potential future leasing will occur only infrequently. The BLM also expects that future leasing of other "hardrock mineral" on acquired lands will be infrequent.

Management actions for other solid leasables generally address those areas open and (or) closed to leasing. Restrictions on development of other solid leasables result from management actions identified in other resource programs. These management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.2.6 Salable

Salable minerals, also known as mineral materials, include common variety materials such as sand, gravel, stone (e.g., decorative stone, limestone, and gypsum), clay (e.g., shale and bentonite), limestone aggregate, borrow material, clinker (scoria), and leonardite (weathered coal). Lapidary quality agates and jaspers are found in Platte and Natrona counties. Recreational collecting of this material is allowed, but large volume removal requires mineral sale. Access to the federal salable mineral estate is at BLM's discretion and by either Free Use Permit or sales contract. Much of what the BLM sells in the planning area is from established community pits. From time to time, a proposal is received requesting an exclusive sale or exclusive Free Use Permit. Map 18 identifies the areas accessible to salable minerals.

In terms of volume produced and value, borrow material was the most important mineral material in the planning area in fiscal year (FY) 2003, followed by sand and gravel, leonardite, and specialty stone. Table 3-13 shows the number of active permits, volumes produced, and values of materials in FY 2003 (BLM 2004c). Other salable minerals produced include riprap and shale (clay).

Table 3-13. Salable Mineral Production in the Casper Planning Area for FY 2003

Resource	Number of Active Permits	Cubic Yards Produced	Production Value
Borrow material	3	298,165	$71,124
Sand, gravel, limestone aggregate, and riprap	41	45,392	$31,898
Leonardite	1	25,000	$22,500
Specialty stone	10	122	$2,105

Source: BLM 2004c
FY Fiscal Year

In the planning area, borrow material is used primarily for remediation cleanup. Sand, gravel, limestone aggregate, and riprap are used as construction materials. Leonardite is used as an additive to drilling mud. Specialty stone can include flagstone, moss rock, and landscape boulders. Riprap is used in soil stabilization projects.

Most salable minerals are common construction materials; demand for these materials is linked to the area's economy. Planning area demand generally coincides with activity in the oil and gas industry, highway construction, and urban use near Casper, Douglas, and smaller towns. Additional demand for construction materials is tied to activity associated with any future proposals for new mines (e.g., coal and uranium). Leonardite demand depends on oil and gas drilling activity. The BLM maintains three "community" mineral material pits to provide sand, moss rock, flagstone, and boulders to the public.

Mineral materials are basic natural resources used in construction; however, they are generally bulky and have low unit prices. The sheer weight of mineral materials results in high transportation costs. Therefore, adequate local supplies of these basic resources are important to the area's economy. The BLM's policy is to make these materials available unless it is detrimental to the public interest to do so. When made available, exploration for and removal of these minerals must protect public surface resources and the environment and minimize damage to public health and safety. Additional planning area information on salable minerals is in the Mineral Occurrence and Development Potential Report (BLM 2004c).

Management actions for salable minerals determine areas open or closed to mineral material development and identify restrictions needed to protect other resource values. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.3 Fire Management and Ecology

The Casper Field Office fire management program focuses on two categories of fires: unplanned and planned. Unplanned or wildland fire occurs as the result of an act of nature (e.g., lightning), human accident, or by intent to cause damage. Planned or prescribed fire is used in a controlled manner for specific purposes, such as improving habitat and plant community health and reducing hazardous fuels. Vegetative types and their respective fire regimes vary throughout the planning area. Table 3-14 displays the number of acres of planned and unplanned fires occurring in different vegetative types. The number of acres burned is calculated as the annual average since 1985 for planned fires and since 1990 for unplanned fires. The Casper Field Office coordinates its fire management program with the USFS, Wyoming State Forestry Division (WSFD), county fire departments, and local fire protection districts.

Table 3-14. Annual Average Acreage of Planned and Unplanned Fires in Different Vegetative Types in the Casper Planning Area

Vegetative Types	Average Number of Acres Burned/Year
Planned Fire 1985-2003	
Aspen and conifers	2
Mountain big sagebrush	378
Mountain mahogany	25
Rocky Mountain juniper forest	3
Subtotal	**408**
Unplanned Fire 1990-2003	
Greasewood-salt desert shrub	42
Forest or woodlands	250
Mountain shrubs	24
Sagebrush grasslands	1,620
Subtotal	**1,936**
Grand Total	**2,344**

Source: BLM 2005c

Under the existing plan, the Casper Field Office identifies site-specific fire management practices for multiple sites within the planning area. These practices vary by site, but generally identify the acreage designated for full fire suppression, limited fire suppression, and sites designated for prescribed burns (Map 19). Full suppression is a strategy requiring immediate and aggressive attack of the fire and typically relies heavily on mechanized equipment on or off roads. In contrast, limited suppression is a less aggressive strategy, generally used to keep a fire within a specified area. For example, in the Southern Bighorns, there are approximately 300,000 BLM acres of limited suppression; 80,770 acres of full suppression; and 7,500 acres of prescribed burns at 59 sites on BLM-administered lands. Current fire management planning emphasizes appropriate management response using limited and full suppression.

3.3.1 Unplanned/Wildland Fire

Public Safety and Resource Protection

An essential component of the Casper Field Office's fire management program is protection of the public and property from the adverse impacts of wildland fires; however, unplanned fire can sometimes serve as a management tool to benefit natural resources. Fire suppression on public lands is guided by objectives in the existing plan and clarified by the annually updated Fire Management Plan (FMP) for the Wyoming

Eastern Zone (BLM 2004d). The FMP was recently refined as a result of the 2003 Risk Assessment and Mitigation Strategy (RAMS) exercise. The Healthy Forests Initiative, Healthy Forest Restoration Act (USC 2003), and the National Fire Plan 2000 also influence the BLM's approach to forest health and fire management in the planning area.

Full suppression provides the most effective and flexible tactics to suppress unplanned fire; however, use of heavy equipment can cause damage to wildlife habitat, soil erosion, water quality degradation, impacts to cultural resources, and facilitate the spread of invasive nonnative plant species (INPS). Full suppression also encompasses the use of fire retardant or foam; however, current practice limits the use of retardant or foam within 300 feet of waterways. In areas where full suppression may impact sensitive natural resources, limited suppression tactics may be utilized.

Lightning accounts for most unplanned fires in the planning area. Since 1990, the majority (1,620 acres) of unplanned fires occurred in the sagebrush and grassland vegetative types on BLM-administered lands in the planning area (see Table 3-14). The largest unplanned fires in the planning area occurred in the sagebrush and grassland vegetative types, relying on the fine fuels of grasses. Surface disturbance and seedbed exposure in these vegetative types resulted in establishment of INPS such as annual bromes, which exacerbate the frequency and spread of unplanned fires in the planning area. See the INPS section of this document for additional discussion.

The forest and woodlands vegetative types host the majority of the wildland-urban interface (WUI) in the planning area (See Glossary for definition of WUI). The size of individual fires and the total annual forest and woodlands acreage burned have been relatively small; however, the presence of WUI in these vegetative types increases the potential risk of unplanned fire.

Fuel Loading

An important objective of the BLM's fire management program in the planning area is to reduce fuel loads (i.e., where fire suppression has allowed fuels to increase above historical levels, usually expressed in tons per acre) with an emphasis on the WUI. The WUI is not addressed in the existing plan; however, the Casper Field Office currently is planning and evaluating options for implementing fuel reduction projects in WUI areas. Mechanical, chemical, and biological fuel treatments for reducing hazardous fuels are tools for fire and fuels management in the WUI and other parts of the planning area. In areas of mixed ownership, modification of vegetative fuels on public land alone does not result in a significant reduction of the threat of wildland fire to private lands and homes; cooperation among all landowners is required.

Using wildland fire for the benefit of resources, managing natural fire regimes, and managing fire return intervals are not addressed in the existing plan. The revised RMP will recognize the use of wildland fire as a tool for resource management when such fires do not threaten life or property and the Casper Field Office will collaborate with county fire departments, local fire protection districts, stakeholders, and the public to identify opportunities to reintroduce fire into the ecosystem.

3.3.2 Planned/Prescribed Fire

Prescribed, or planned, fire (as well as some wildland fire) is a management tool used to maintain or increase age-class diversity within vegetative types (e.g., big sagebrush/grassland); rejuvenate fire-dependent vegetative types (e.g., true mountain mahogany/ponderosa pine); maintain or increase vegetation productivity, nutrient content, and palatability; and maintain or improve wildlife habitats, rangeland, and watershed conditions. Fire also is considered a management tool for disposal of timber slash, seedbed preparation, reduction of hazardous fuel, control of disease or insects, grazing management, thinning, or plant species manipulation. Under current management, use of prescribed fire

to manipulate vegetation is in accordance with treatments identified by the range, wildlife, and forestry programs. Prescribed fire currently is allowed on highly erosive soils, but is prohibited within bald eagle roosts from November 1 through March 31.

3.3.3 Rehabilitation

The existing plan contains no specific decisions regarding rehabilitation; thus, rehabilitation is conducted on a case-by-case basis. Rehabilitation may be necessary following fire suppression, wildland fire, and prescribed burns to address the following:

- Emergency stabilization and rehabilitation. The BLM will identify actions, such as seeding, fencing, and temporary closures, that could be taken to stabilize or rehabilitate burned areas.
- Restrictions. Use of heavy equipment near known National Historic Trail (NHT) ruts, crucial big game winter range, and special status species' habitats is restricted; however, practical application of these restrictions is vague and does not include guidance to protect areas with sensitive soils and fragile watershed conditions or important cultural/historic resources.
- INPS. Burned areas and areas subject to fire suppression usually offer an excellent opportunity for the establishment or expansion of INPS. Pre- and post-fire management is crucial and, as within WUI areas, dependent on a cooperative approach by all landowners.

Management challenges related to fire include the ability of the BLM to control fire; the potential unintended impacts of fire on visibility and public health; the use of fire as a resource management tool; fire management in the WUI; linking fire management activities and resource management goals and objectives; consideration of natural fire regimes, fire return intervals, and desired future vegetative types; the impacts of fire on INPS and habitat for wildlife and special status species; and post-fire livestock grazing management. For example, when the BLM develops management strategies, the agency must recognize the role of wildland fire as an essential ecologic process. At the same time, these strategies also must include firefighter and public safety, suppression costs, the values to be protected, as well as be consistent with resource program objectives. While protection of human life is the single overriding priority in the BLM's fire management decisions, the BLM also considers community infrastructure; private property; natural and cultural resources; and social, economic, and political factors. For example, BLM policy requires a minimum of 2 years deferment of livestock grazing from burned areas. This policy, land-ownership patterns, and the economic impact of deferring grazing for 2 years, limit the number of prescribed fire projects that have occurred on grazing allotments in the planning area. Management actions addressing these challenges are incorporated in the alternatives and described in more detail in Chapter 2.

3.4 Biological Resources

This section describes the affected environment (i.e., existing conditions) for habitat fragmentation, biological diversity, and individual biological resources (i.e., vegetation, fish, wildlife, and special status species). Habitat fragmentation and biological diversity are not considered resources or resource uses; rather, they reflect conditions within the planning area that can be impacted (beneficially or adversely) by BLM management actions and allowable uses, as expressed in the alternatives (see Chapter 2). Therefore, the existing condition of habitat fragmentation and biological diversity are described in this section. Following the descriptions of habitat fragmentation and biological diversity, the existing conditions of individual biological resources are described, beginning with vegetation and followed by fish and wildlife and special status species.

Due to the complexity of biological resources and the vast size of the planning area, this section does not attempt to provide an encyclopedic description of all vegetation, fish, wildlife, and special status species; rather, based on issues identified during the scoping process and BLM's MSA, this section focuses on existing biological resource conditions in the planning area, which may be further impacted (beneficially or adversely) by alternatives. Chapter 4, Environmental Consequences, describes the potential environmental consequences (i.e., impacts) of each alternative related to individual biological resources.

Habitat Fragmentation

As large contiguous blocks of habitat are dissected into smaller blocks, they become isolated from one another by dissimilar habitats and land uses. For example, a contiguous 100,000-acre block of sagebrush habitat is considered fragmented when a road or other development is constructed within the habitat, thereby dissecting the block. If, in this example, the road dissects the 100,000-acre block in half, the result of this fragmentation is two 50,000-acre blocks of sagebrush habitat dissected by a road. As blocks of habitat are repeatedly dissected into smaller blocks, adverse impacts, including isolation, can occur to individual plant and animal species and communities occupying the habitat. The impacts of habitat fragmentation to biological resources can occur on multiple scales.

Actions that result in habitat loss are exacerbated when fragmentation reduces the size and (or) isolates remaining habitat patches below size thresholds necessary to support particular species. For example, some large birds (e.g., northern harrier) in the planning area have large territorial requirements, while smaller birds (e.g., Savannah and grasshopper sparrows) in the planning area favor habitat areas that are larger than their territory (Johnson 2001). These species are area-sensitive and habitat loss and fragmentation that reduces or isolates their area thresholds likely affects their distribution and abundance in the planning area.

At the landscape scale, vegetative types within the planning area are naturally distributed based on physical factors of geology, hydrology, elevation, soils, and climate. For example, Wyoming big sagebrush and grassland, the most common community in south-central Wyoming, is located primarily in the western half of the planning area on shallow to deep soils at elevations below 7,000 feet. Wyoming big sagebrush/grassland and other communities in the planning area were initially fragmented by land ownership and associated land management practices during Anglo settlement beginning in the late 1800s (Map 1). The Homestead acts and early Anglo settlement of Wyoming introduced people, trails, livestock, agriculture, irrigation, and energy development to the planning area, all of which contributed to changes in land management and habitat fragmentation. Subsequent development of the region in the early to mid 1900s included establishment of the railroad and a road network to connect population centers. In the late 1900s, ever-increasing rural development of homes and recreational properties (the WUI) further fragmented planning area habitats. Animal-vehicle collisions resulting from increased

traffic in these areas and the risk to private property from wildland fire are both consequences and reminders of existing habitat fragmentation conditions within the planning area.

Currently, the planning area is primarily fragmented by linear features including roads, railroads, trails, irrigation systems, and ROW. I-25 and a network of state highways, county roads, local roads on private and public lands, the Burlington Northern Railroad, and the Colorado and Northwestern Railroad dissect much of the planning area. The development of irrigation reservoirs and districts with their associated water-distribution systems has also contributed to habitat fragmentation in the planning area. Similar to a network of roads, the Pathfinder, Alcova, Goldeneye, Guernsey, Grayrocks, and Glendo reservoirs, the North Platte and Laramie rivers, as well as associated irrigation water-distribution systems, dissect planning area habitats. Irrigation water also has supported the conversion of native plant communities to hayfields, pasture, and cropland, thereby, further fragmenting habitats. Fences can block migration routes for some wildlife species, such as pronghorn, consequently fragmenting their habitats. While this has been an issue in other parts of Wyoming, it has not been identified as an issue in the planning area. The conversion of large acreages of sagebrush to predominately grassland communities can fragment habitat for sagebrush-dependent species such as the sage-grouse. Existing corridors (Map 43) parallel I-25, in part, between Casper and Midwest to the north and parallel Highway 26 between Casper and Waltman to the west. However, other existing corridors do not parallel roads, thus increasing fragmentation.

Habitat fragmentation in the planning area is most obvious along the linear features identified in the previous discussion; however, fragmentation also occurs at population centers, reservoirs, and other developments where humans live, recreate, and work. For example, the development of large private parcels bordering BLM-administered lands has, in some instances, contributed to habitat fragmentation by the conversion to subdivisions or smaller ranchettes. This type of land conversion and habitat fragmentation primarily occurs near population centers and the WUI. Buildings, roads, fences, and utility corridors associated with residential and commercial developments all have contributed to fragmentation of planning area habitats.

In addition to the described linear features and other types of development, conditions on BLM-administered land continue to be influenced by the management of resources and resource uses, including mineral resources; fire management and ecology; forests, woodlands, and forest products; and land resources. The reader of this document should refer to the individual sections in this chapter for additional details regarding existing conditions of these resources and resource uses.

In general, development and the associated construction and maintenance of roads, railroads, well pads, pipelines, and power lines has fragmented habitat in the planning area. In addition, prescribed and wildland fire have sometimes contributed to temporary habitat fragmentation in the planning area. Intense and large area burns temporarily can isolate individual species and communities of plants and less mobile species of animals. A frequent fire return interval often associated with INPS can effectively fragment habitat over the long term. Similar to fire, mechanical vegetative treatments have generally been temporary in nature and, on public lands, have consisted of small acreages. OHV use may also contribute to habitat fragmentation through the transportation of INPS seeds. Management actions to address these challenges are incorporated in alternatives for biological resources in Chapter 2.

Biological Diversity

The Keystone Center (1991) defines four elements of biological diversity relating to scale:

1. Genetic diversity
2. Species diversity
3. Community or ecosystem diversity
4. Landscape or regional diversity.

Biological diversity is a complex subject that makes the measurement of existing conditions difficult. Species diversity is probably the most recognizable and easily understood element of biological diversity and, for this RMP revision, is defined as the variety of species found in the planning area. In other words, species diversity includes the numbers and distribution of all species in the planning area. This includes species (e.g., cottontail rabbits, coyotes, elk, pronghorn, etc.) that are common and plentiful, as well as other species (e.g., Laramie columbine, mountain plover, bald eagle, etc.) that are less common or rare. Classifying rare species as sensitive, threatened, or endangered is one way of conserving biological diversity because these classifications heighten awareness for conservation of rare species.

Spatial and temporal scales are also important considerations for conserving biological diversity. For example, nonmigratory populations of mammals are sometimes temporarily diminished following a harsh winter and limited food supply. In addition, migratory birds may return to breeding grounds with diminished populations due to the stress factors associated with migration. In these instances, the lower number of individuals of wildlife populations does not necessarily equate to a reduction in biological diversity in the planning area because the number of individuals ultimately (all else being equal) return to pre-winter levels. Permanent reductions in the four elements of diversity listed above are considered adverse impacts to biological diversity for this RMP revision.

Counting the number and relative frequency of species occupying an area over time is one means of identifying reductions in species diversity; however, this approach can be overly simplistic and does not necessarily address the other three elements of diversity. Currently, there is no single, commonly accepted scientific protocol for measuring biological diversity. Nevertheless, it is generally accepted that "…reducing the number of biological entities in a system or making some of them less abundant reduces diversity" (Langner and Flather 1994). Biological diversity in the planning area is currently addressed by strategies such as the BLM's National Sage-Grouse Habitat Conservation Strategy.

Climatic factors (e.g., drought), disease, fire regime, predation, competition, and population cycles all have contributed to the current natural variability in number and relative frequency of individuals, species, and communities of plants and animals in the planning area. Other factors include surface-disturbing activities (e.g., road and well pad construction), the physical and chemical environment (e.g., soil nutrients and water), adjacent area vegetation (e.g., croplands), historic vegetation, INPS, herbivory (e.g., native ungulates and livestock), and the planning area's existing vegetation.

The current condition for biological diversity in the planning area is a function of physical factors (e.g., soils, geology, air, water, geography, and elevation), natural factors (e.g., fire, drought, disease, evolution), and human actions. In the context of these physical and natural factors, biological diversity evolved over time to produce the diversity present in the planning area prior to Anglo settlement. Human actions during the subsequent 140 years changed the pattern, composition, structure, and function of plant and animal communities within the planning area, thus affecting the pre-Anglo biologically diverse settlement. Management challenges for biological diversity include competing resources and resource uses. Management actions to address these challenges are incorporated in alternatives for physical and biological resources and for fire management and ecology in Chapter 2.

Vegetation

The convergence of two physiographic regions (Interior Plains and Rocky Mountain System) and a wide range of topography result in a diversity of vegetative types in the planning area (Maps 20 and 21). Table 3-15 summarizes the extent of nine vegetative types within the planning area. Grasslands and sagebrush types, followed by desert shrubs and saltbush-greasewood flats and woodlands, dominate vegetation in the planning area. Lodgepole pine and ponderosa pine forests are limited to approximately 5 percent of the planning area at higher elevations. Existing conditions for four categories of vegetation (forests,

woodlands, and forest products; grassland and shrubland communities; riparian and wetland communities; and INPS and pest control) are described in the following sections.

Table 3-15. Vegetative Types and Acreage in the Casper Planning Area

Vegetative Type	Total Acreage	BLM Acreage	Percent BLM Surface Acreage
Altered by Human (agriculture, mining, urban)	1,126,287	12,371	0.9
Grasslands	3,091,713	299,954	22.0
Sagebrush	2,408,101	630,183	46.2
Ponderosa/Lodgepole pine forests	549,340	66,182	4.9
Desert Shrubs and Saltbush-Greasewood flats	460,426	181,064	13.3
Aspen/Juniper/Limber pine woodlands	314,862	101,882	7.5
Mountain shrubs	204,218	46,779	3.4
Riparian and Wetland	243,184	12,960	1.0
Other (Rock outcrops, water)	123,216	10,202	0.9
Total	8,521,347	1,361,577	100

Source: BLM 2005a

BLM Bureau of Land Management

Note: Percentage may not sum to 100 due to rounding; totals for acreage columns do not equal total planning area and total BLM-administered land within planning area due to differences in source files for boundary and for vegetation.

3.4.1 Vegetation – Forests, Woodlands, and Forest Products

This section describes existing conditions for forests, woodlands and forest products. Current management of these vegetation categories is also described.

Forest Communities

The Casper Field Office administers approximately 165,004 acres of forests and woodlands (delineated in Table 3-16). Forests and woodland acres are distinguished by the type (species composition), size, and density of the trees.

Table 3-16. Distribution of Forests and Woodlands on BLM-Administered Land in the Casper Planning Area

Classification	Distribution (Acreage)	Percent of BLM Surface Acreage
Forests	66,005	4.8
Woodlands	98,999	7.3
Total	165,004	12.1

Source: BLM 2003d

BLM Bureau of Land Management

The 66,005 acres of forests on BLM-administered land in the planning area include lodgepole pine, ponderosa pine, and scattered areas of Douglas fir. Included in this acreage are 17 Forest Management Areas (FMAs) on BLM-administered land (Map 21). The 17 FMAs are scattered throughout mountainous regions of the planning area as isolated stands of forests. The importance of these forest stands is a function of their distribution, relatively long rotation age (number of years to maturity), and the

diversity of plants and animals they support. Age-class distribution in the planning area currently is unbalanced, tending toward mature, heavily stocked stands. Portions of these stands remain healthy but many are declining in tree vigor and productivity (BLM 2003d). The advanced age and density of these stands, combined with the lack of sivilculture treatments and a natural fire regime, have contributed to the decline in overall health of forest stands in the planning area. For this section, *silviculture treatments* are synonymous with *vegetation treatments* and include methods anticipated to manage natural processes, insects, and disease, structure, density, species composition, age-class distribution; and site-quality of forest stands. Treatments include the use of mechanical, chemical, and prescribed fire to harvest, thin, release, regenerate, prune, salvage, and otherwise affect forest stands.

For the most part, lodgepole pine stands are struggling, with the components of density and a lack of age-class distribution, for growth and survival. This species is suffering from mountain pine beetle and dwarf mistletoe infestations in scattered patches throughout the planning area. This is a result of the need for fire and forest management to manipulate these components to provide essential ingredients for a vigorous and overall healthy forest.

Ponderosa pine forest stands contain better age-class diversity and better spacing than lodgepole pine stands and are, therefore, healthier and more vigorous. Ponderosa pine is more fire tolerant and grows well on poorer sites; however, some stands of ponderosa pine are exhibiting damage from the mountain pine beetle and over maturity.

Woodland Communities

Woodlands range from small monotypic to larger mixed stands of quaking aspen, limber pine, and Rocky Mountain juniper. Inventory data are not available for woodland communities in the planning area; however, in general, distribution of quaking aspen has decreased while limber pine and juniper stands have increased. Woodland species occasionally are used for firewood, decorative, and hobby applications, but are not important commercially at this time. On the other hand, woodland communities are important ecologically, especially as wildlife habitat.

Aspen are scattered throughout the planning area, although most stands are maturing and distribution is declining. Aspen stands also appear to be declining throughout the interior west, due to age and conifer invasion (Bartos and Campbell 1998; Kulakowski et al. 2004; Knight 2001; WSFD 2001). Many of these stands have declined due to the lack of fire to control competition and stimulate regeneration, ungulate use, and advanced age. Aspen stands typically exhibit a diversity of understory vegetation, are used by wildlife and livestock, can serve as a natural fire break, and often occur as part of an important riparian and wetland component in the forest system. According to a report on forest health published by the WSFD, the average age of aspen forests is 68 years (WSFD 2001). Older aspen stands on Muddy Mountain, Casper Mountain, and the foothills of the South Bighorns are showing signs of increased cankers, conks, and decay in the boles.

Juniper woodlands typically comprise Rocky Mountain juniper stands sometimes mixed with Utah juniper and limber pine located on steep slopes and ridge tops. After long periods of time without fire, juniper species encroach into and dominate sagebrush communities. The existing plan does not specifically identify actions for treating woodland encroachment. The most notable juniper woodlands are in Natrona County adjacent to the Alcova Reservoir, Cedar Ridge, and the west slope of Casper Mountain (BLM 2003d).

Limber pine is another vegetative type comprising woodland communities. Although not considered a commercial species, limber pine is an important food and cover source for birds and other wildlife. Limber pine has been plagued by a blister rust in many locales of the planning area.

Forest Products

With the exception of the Muddy Mountain area, no active forest management occurred on forestlands in planning area FMAs from 1990 to 2001. Consequently, current forest inventory data for the planning area are limited. Historically, forest products from public lands in the planning area have played a small role in the wood product industry. However, since the development of the Muddy Mountain Forest Health Recovery Plan (BLM 2001c), the public has responded to the sale of posts and poles, firewood, and wood for landscaping and furniture.

Management of Forests, Woodlands, and Forest Products

Fragmentation of forests and woodland communities within the planning area has occurred through localized development of roads, forest management, or from natural processes such as climate, disease, insects, or wildland fire. These historic disturbances have affected the size and distribution of forests and woodlands throughout the planning area. For example, dwarf mistletoe in conifer stands, blister rust on limber pines, and mountain pine beetle and Ips beetle in conifer stands are the insect- and disease-damaging agents of primary concern in the planning area. Stand densities, age-class distribution, and overall health are affected by the invasion and spread of these agents.

The Casper Field Office has developed management treatments to maintain and enhance the multiple use of forests and woodlands. The responsibility of the Casper Field Office is to analyze the circumstances surrounding each forest and woodland area and to implement the management treatments to achieve desired goals. In the existing plan, these goals encompass the establishment, composition, structure, and growth of forests and woodland areas. The BLM's existing plan is designed to restore and maintain forest health whereby forest management activities are directed in accordance with sound silvicutural and multiple use practices.

Since 2000, a gradual increase has occurred in the number of government programs emphasizing forest conditions and health on public lands (GAO 2003). For example, the Healthy Forests Restoration Act (HFRA) was signed in 2003 to address catastrophic wildland fire. Ecosystem management recognizes that fire, as well as insects, disease, drought, and external factors, affect resource conditions. For example, lack of a natural fire regime affects forest composition, species diversity, age-class distribution, and structural stage composition. The lack of a natural fire regime in forests and woodlands in the planning area has resulted in increasing stand densities and abundant ground fuels. Because natural regeneration of lodgepole pine and aspen relies on fire, fire suppression also has contributed to changes in the composition and structure of forest and woodland communities. In the absence of natural fire regimes, active management is necessary to ensure the health and vigor of forest and woodland communities.

Management challenges for forests, woodlands, and forest products in the planning area generally include lack of a natural fire regime and fuel management; management of fragmented and isolated stands; encroachment of woodland species into other vegetation types; lack of a current forest inventory; declining or over mature stands; and management of disease, insects, pathogens, and INPS. Management actions designed to address these challenges are included in the alternatives and described in more detail in Chapter 2.

3.4.2 Vegetation – Grassland and Shrubland Communities

Grassland communities comprise approximately 22 percent of the public land surface administered by the BLM in the planning area and are represented primarily by mixed grass prairie; however, short- to mid-size grasses also occur. Shrubland communities comprise approximately 63 percent of BLM-

administered land in the planning area and are represented by the desert-shrub and saltbush-greasewood flats, mountain shrub, and sagebrush vegetative types (see Table 3-15).

Most grassland and shrubland communities in the planning area have been influenced by surface-disturbing activities, livestock grazing, fire or fire suppression, and INPS. See also the Livestock Grazing, Fire Management and Ecology, and Vegetation – Invasive Nonnative Plant Species sections of this document.

Grasslands

Mixed-grass prairie grasslands occur primarily at lower elevations and on rolling plains and foothills in the eastern two-thirds of the planning area. As shown in Map 20, this area occupies most of Converse, Platte, and Goshen counties, north and east of the Laramie Range, and a small part of eastern Natrona County. This vegetative type primarily includes grasses and forbs, but does contain some shrub species. Grass and grass-like plants that are common to this type include western wheatgrass, needle-and-thread, prairie Junegrass, Indian ricegrass, blue grama, Sandberg bluegrass, sand dropseed, threeawn, little bluestem, and threadleaf sedge. The most common shrubs are Wyoming big sagebrush, silver sagebrush, sand sagebrush, snowberry, and Douglas rabbitbrush. Common forbs include fringed sagewort, scurfpea, prairie clover, milkvetch, American vetch, yarrow, buckwheat, and prickly pear cactus. The mixed-grass prairie vegetation type predominantly is used for livestock and wildlife grazing.

Other grassland communities, present within the planning area, inhabit shallow soil sites that are too dry to support many shrubs or trees. These grasslands comprise short- to mid-size grass species and numerous mat-forming forbs. These communities are found primarily in Natrona County in the southern foothills of the South Bighorns.

Shrublands

Shrubland communities occur throughout the planning area and dominate the majority of the public land surface administered by the BLM. These communities are diverse and primarily include three vegetative types: desert shrub and saltbush-greasewood flats, mountain shrub, and sagebrush.

Greasewood

Greasewood-dominated shrublands occur primarily on lowland positions adjacent to streams, playas, lakes, and ponds. They usually occur in areas that receive lower amounts of precipitation and on soils that contain at least moderate amounts of salinity or alkalinity. Greasewood is a halophyte that does well in very saline soils; however, it needs more soil moisture to survive than does saltbush. A good example of this vegetation community is located along the floodplain of lower Bates Creek in south central Natrona County.

Where greasewood is the dominant shrub, subdominant shrubs include Gardner saltbush, shadscale, rubber rabbitbrush, Wyoming big sagebrush, and basin big sagebrush. The understory is limited to salt-tolerant herbaceous vegetation, such as inland saltgrass, western wheatgrass, alkali sacaton, bottlebrush squirreltail, Sandberg bluegrass, biscuit root, Hood's phlox, pepperweed, and sea blight. In places, cheatgrass is a substantial component of the understory vegetation.

Although greasewood is not considered very palatable to livestock or big game wildlife, pronghorn and sheep will eat the spiny stems and leaves in the spring and early summer. Cattle use greasewood in the summer and fall as a source of salt. Greasewood contains soluble oxalates that can be poisonous to both sheep and cattle. Greasewood communities are important for providing cover to wildlife and livestock and important spring habitat for mule deer.

Saltbush

Salt desert shrubland is perhaps the most arid vegetation type in the Intermountain West (Knight 1994). Gardner saltbush dominates this community type in the planning area and, in some instances, makes up 90 percent of the vegetative cover. These areas are characterized by accumulations of salt in soils developed primarily from sodic shale. Soils of these areas usually have a potential of hydrogen (pH) of 7.8 to 9, which restricts the uptake of soil minerals and nutrients. The soils in these areas restrict the uptake of water and soil nutrients by all but the most tolerant of plants, usually halophytes.

Gardner saltbush normally grows no higher than 12 inches, and may grow along the ground forming a mat. Subdominant shrubs in areas dominated by Gardner saltbush include birdfoot sage, bud sage, spiny hopsage, broom snakeweed, shadscale, and Douglas rabbitbrush. Some greasewood also may be found in this community. Grasses associated with these sites include Indian ricegrass, bottlebrush squirreltail, Sandberg bluegrass, and western wheatgrass. Forbs found in these areas include wild onion, biscuitroot, woody aster, winterfat, Hood's phlox, globemallow, and prickly pear cactus.

Saltbush communities within the planning area occur on relatively flat to steep, highly eroded hills at lower elevations, usually in areas of low precipitation. Examples of this vegetative type can be found in the Bates Hole and Anderson Draw areas west and southwest of Casper. Gardner saltbush is a valuable forage species on winter and spring ranges for wildlife and livestock. In the spring, when Gardner saltbush is green, its protein content can be higher than late-season alfalfa, and is a preferred livestock forage for lambing sheep and calving cattle.

Mountain Shrublands

Mesic Upland Shrub Steppe

Chokecherry is the primary shrub in this community, often growing in conjunction with snowberry, currant, Wood's rose, serviceberry, and Rocky Mountain maple. Mesic Upland Shrub Steppe is usually found at low to mid elevations in areas that receive greater moisture due to snow accumulation, runoff, or subsurface flow. These areas include drainage bottoms, north slopes, and the leeward side of hills. This community usually exists as dense but scattered stands of shrubs and is often adjacent to aspen and willow communities. Chokecherry, serviceberry and maple in these areas may grow to be 15-feet high. Herbaceous understory vegetation includes basin wildrye, green needlegrass, Columbia needle grass, bluebell, columbine, aster, yarrow, and violet. Although the Mesic Upland Shrub Steppe is found across the planning area, individual stands are seldom more than ½ acre in size.

This community provides hiding and thermal cover for deer, elk, and other wildlife species. The dominant shrubs provide excellent forage for browsing animals when their softer leaves and shoots are within reach. These shrubs reestablish following fire, often in less dense patches, making them more accessible to wildlife and livestock. The new growth is highly palatable and is sought out by browsing animals.

Xeric Upland Shrub Steppe

True and curl-leaf mountain mahogany dominate this plant community. True mountain mahogany is found in the southern portions of the planning area along the foothills of the Laramie Range. Curl-leaf mountain mahogany is found in the northwestern part of the planning area on the southern slopes of the South Bighorns. Both species grow on dry sites, usually rocky slopes and ridges with shallow soils. Mountain mahogany usually occurs as the dominant shrub but sometimes grows in conjunction with juniper, antelope bitterbrush, currant, snowberry, Douglas rabbitbrush, and Wyoming and mountain big sagebrush. Grass species found in the understory include bluebunch wheatgrass, Indian ricegrass, Sandberg bluegrass, mutton bluegrass, and western wheatgrass. Forb species found in the understory

include phlox, buckwheat, locoweed, Hooker sandwort, goldenweed, and milkvetch. Cheatgrass is a dominant component of the understory vegetation within some true mountain mahogany communities.

Mountain mahogany may grow to a height of 5 to 7 feet, depending on the extent of browsing and depth of soil. Many of these communities consist of mature and often decadent plants with little recruitment of young plants. Fire generally lessens the density of the shrub stands, allowing grasses and other herbaceous plants to increase, while still providing wildlife browse. Mountain mahogany is an important fall and winter forage species for deer and elk and is also utilized by livestock. Mountain mahogany communities within the planning area usually provide crucial winter range for mule deer.

Sagebrush

Sagebrush-dominated communities are the most common vegetative type in the planning area. These communities are found on approximately 630,183 acres (46 percent) of public land surface within the planning area and include Wyoming big sagebrush and grassland; mountain big sagebrush and grassland; silver sagebrush and grassland; basin big sagebrush shrubland; and the low sages—birdfoot and Wyoming threetip sagebrush and grassland. Fire is an important component of all sagebrush-dominated plant communities. It can create a mosaic of seral stages across the landscape that benefits numerous species of wildlife. Depending on the nature of the site, the fire return interval can be between 25 and 100 years (Knight 1994). Following a stand replacement fire, it can take more than 20 years for sagebrush to return to pre-burn densities. The return interval for sagebrush is based on several factors, including fire intensity, species of sagebrush, soil, precipitation, percent slope, aspect, and availability of seed source.

Sagebrush communities are important sources of food and cover for numerous wildlife species found in Wyoming. Sagebrush obligate species include the sage sparrow, Brewer's sparrow, sage thrasher, greater sage-grouse, sagebrush vole, sagebrush lizard, and pronghorn. See also Fish and Wildlife Resources – Wildlife and Special Status Species – Wildlife sections of this document.

Wyoming Big Sagebrush and Grassland

Wyoming big sagebrush and grassland is the most common community in south-central Wyoming. It occurs primarily in the western half of the planning area, on shallow to deep soils at elevations below 7,000 feet. Between 6,000 and 7,000 feet, Wyoming big sagebrush grows in conjunction with mountain big sagebrush. In these areas, Wyoming big sagebrush usually is found on drier sites, while mountain big sagebrush is found on deeper soils and in areas receiving greater moisture, such as drainage bottoms. Shrub height varies from as little as 8-inches tall on shallow soils to around 30-inches tall on deeper soils. The canopy cover for Wyoming big sagebrush communities usually does not exceed 30 percent.

Wyoming big sagebrush often appears as the dominant plant in mosaic communities intermixed with other shrubs and open grasslands. On shallow or rocky to gravelly soils, Wyoming big sagebrush may be co-dominant with black sagebrush and Douglas rabbitbrush. On lighter textured soils, such as sandy loams, Wyoming big sagebrush may be co-dominant with silver sagebrush, Douglas rabbitbrush, and winterfat. Grass and forb species vary depending on soil texture, aspect, and slope. Common grass and grass-like species include bluebunch wheatgrass, western wheatgrass, Sandberg bluegrass, mutton bluegrass, Indian ricegrass, needle-and-thread, green needlegrass, prairie June grass, threadleaf sedge, and bottlebrush squirreltail. Common forbs include phlox, sandwort, buckwheat, penstemon, Indian paintbrush, globemallow, astragalus, and prickly pear cactus.

Wyoming big sagebrush is the most frequently consumed sagebrush by wildlife and is a staple for pronghorn, mule deer, and the greater sage-grouse. In the planning area, Wyoming big sagebrush is generally the dominant species found on pronghorn and mule deer crucial winter ranges. Many of the Wyoming big sagebrush communities in the planning area have even-aged stands of mature and often

decadent plants, which presents a problem on crucial mule deer and pronghorn winter ranges due to the poor forage quality of older plants and lack of new young plants.

Mountain Big Sagebrush and Grassland

Mountain big sagebrush is located on shallow to deep soils at elevations above 7,000 feet. In areas where mountain big sagebrush grows in conjunction with Wyoming big sagebrush, mountain big sagebrush generally grows on the deeper soils and in areas receiving more moisture, either through runoff or snow accumulation. At higher elevations, mountain big sagebrush occurs as smaller plant communities in mountain areas and is often intermixed with aspen and conifer woodlands. Shrub height varies from 10 to 30 inches, with canopy cover reaching 50 to 60 percent.

Other shrubs found in mountain big sagebrush communities are antelope bitterbrush, serviceberry, threetip sagebrush, and snowberry. Associated grasses include Idaho fescue, king spike fescue, green needlegrass, Colombia needle grass, mutton bluegrass, big bluegrass, western wheatgrass, basin wildrye, and elk sedge. Common forbs found in these areas include Indian paintbrush, lupine, larkspur, penstemon, violet, and Oregon grape.

Mountain big sagebrush is palatable to wildlife, although browsing is sometimes limited when the higher elevation habitats become unavailable due to snow accumulation. Mountain big sagebrush provides hiding and nesting cover for various wildlife species. Following fire, mountain big sagebrush reestablishes as the dominant species more quickly than other sagebrush types, often resuming dense canopy cover after 20 to 30 years. The natural fire-return interval in this sagebrush type is 20 to 75 years.

Silver Sagebrush and Grassland

Silver sagebrush and grasslands have two subtypes occupying distinctly different habitats in the planning area. The more common subtype is found on deep sandy-textured soils where silver sagebrush is the dominant shrub, but other shrubs (including Wyoming big sagebrush, Douglas rabbitbrush, and rubber rabbitbrush) are usually present. In sand dune areas, silver sagebrush may be the only shrub present. Associated herbaceous species include needle-and-thread, Indian ricegrass, threadleaf sedge, blue grama, prairie sandreed, sand dropseed, scurfpea, buckwheat, and prickly pear cactus.

The second subtype of silver sagebrush and grassland is not abundant and is located in drainage bottoms and riparian areas above the wet sedge and rush zone found along the streambank. Other vegetation found in this subtype include basin wildrye, Kentucky bluegrass, redtop, streambank wheatgrass, Baltic rush, clover, dandelion, aster, and ,occasionally, cottonwood and willow.

Silver sagebrush is desirable forage for both livestock and big game species because it provides important habitats for various wildlife species. Silver sagebrush responds well to fire as it has the capability to send up new stems from root crowns after burning.

Basin Big Sagebrush Shrubland

Basin big sagebrush shrubland is found in moderately deep to deep soils of all soil textures in zones of 10 to 16 inches of annual precipitation (Beetle 1960). It occurs as pockets within Wyoming big sagebrush, Gardner saltbush, and greasewood communities as the dominant shrub type along valley bottoms, canyons, and isolated ephemeral washes. This subspecies of big sagebrush may reach 12 feet in height, with canopy cover reaching 70 percent. Basin big sagebrush shrubland is not abundant within the planning area on BLM-administered land.

In addition, basin big sagebrush shrubland is not very palatable forage, usually serving as little to no use, even in extreme winters when use levels of other plants are severe. It is important, however, as cover for

mule deer and elk, and as habitats for other wildlife species. Basin big sagebrush shrubland may also be important to greater sage-grouse in severe winters. Basin big sagebrush shrubland can increase in density and cover with poor livestock management and interruptions in the fire cycle.

Low Sages – Birdfoot and Wyoming Threetip Sagebrush and Grassland

Birdfoot sagebrush is found at elevations below 7,000 feet on clay to dense-clay alkaline soils where pH ranges from 8.5 to 11. At lower pH levels, Gardner saltbush is often found growing in birdfoot sagebrush communities along with a variety of grasses and forbs. Grasses that are present include western wheatgrass, Indian ricegrass, Sandberg bluegrass, and bottlebrush squirreltail. Forbs that are present include woody aster, Hood's phlox, biscuitroot, and wild onion. At higher pH levels, birdfoot sagebrush occurs as a monoculture. Most of the birdfoot sagebrush communities are found in the western part of the planning area in Natrona County.

Wyoming threetip sagebrush occurs at elevations above 7,000 feet in the foothills of the various mountain ranges on shallow to moderately deep, well-drained soils. It normally grows to between 4- and 15-inches tall and is found intermixed with mountain big sagebrush and black sagebrush. Grasses and forbs found in this community include Idaho fescue, king spike fescue, Colombia needle grass, mutton bluegrass, elk sedge, Indian paintbrush, mountain pea, larkspur, balsamroot, phlox, Hooker sandwort, and buckwheat. Wyoming threetip sagebrush does not appear very palatable to either livestock or wildlife in the summer or winter. Its location on windswept ridges and knolls may cause it to be used as emergency winter forage, especially for big game (Beetle and Johnson 1982). This community-type responds well to low-intensity fires, but may be set back by high-intensity fires. Large fires rarely occur in this type due to the lack of fuel needed to carry the fire through it. The ability of Wyoming threetip sagebrush to stump sprout and layer makes its control difficult.

Management challenges for grassland and shrubland communities include the invasion and spread of INPS; lack of a natural fire regime; over-mature stands with insufficient recruitment; integrating treatments of multiple resource programs to achieve landscape-level objectives; competition for forage between native ungulates and livestock; habitat fragmentation; restoration of areas damaged by surface-disturbing activities to mitigate potential impacts regarding erosion and water quality; and maintaining a distribution and diversity of these communities sufficient to support wildlife, special status species, livestock, and other competing multiple-use demands on BLM-administered lands. As appropriate, management actions designed to address these challenges were identified during the alternative formulation planning phase and are incorporated in the alternatives described in Chapter 2 of this document.

3.4.3 Vegetation – Riparian and Wetland Communities

Riparian and wetland communities are areas that exhibit persistent water or obligate vegetation (e.g., sedges, rushes, willows) reflecting the availability of surface or groundwater. Vegetation found in these communities typically is adapted to flooding disturbances or saturated (water-logged) soils. Due to their importance in the landscape, wetlands are legally protected and are defined and delineated by use of a manual to determine the simultaneous presence of specific criteria for soil, water, and vegetation (Environmental Laboratory 1987). For the purpose of this discussion, references to wetlands are not restricted to the legal definition.

Riparian areas support more wildlife diversity than any other habitats (WGFD 1999) and are the single most productive wildlife habitat type in Wyoming. Many wildlife species depend on these habitats for all or part of their life-cycle (WGFD 1999). Healthy riparian areas provide vertical structural complexity, canopy, and subcanopy layers as well as a ground layer that supports species diversity. In addition to being an integral part of watershed health, riparian areas are desired for their recreation, fish and wildlife,

water supply, cultural, and historical values as well as for their economic values stemming from their use for livestock production and mineral extraction (BLM 1998a).

About half of the bird species found in riparian habitats are obligate species (Howe et al. 2004). In general, the greater the diversity of habitat along a river or stream, the greater the species diversity of aquatic and riparian biota (Wohl 2004). Riparian habitats support extended forb production and diversity in vegetation and structural complexity that provides for biological communities rich in insect composition (Connelly et al. 2004). Most birds are insectivores during the breeding season (Howe et al. 2004). Emerging aquatic insects are a large part of the diet of birds using riparian areas (Moline 2004). These factors make riparian areas the most important habitats to avian biodiversity across the West (Howe et al. 2004). Greater sage-grouse depend on riparian areas in the summer for late brood-rearing habitat. After upland forbs have expired, greater sage-grouse move into mesic riparian habitats as forbs generally are still available in these areas for several more months (Connelly et al. 2004).

Compared to uplands, healthy riparian areas generally are lusher and stay greener for a longer portion of the year (WGFD 1999). Typical plant species found in riparian and wetland communities in the planning area include cottonwoods, willows, rushes, sedges, redtop, bluegrass, saltgrass, horsetail, dock species, iris, wild licorice, arrowgrass, bulrushes, and cattails. In addition to these native plant species, several INPS are prevalent in riparian areas found in the planning area, including Russian knapweed, Canada thistle, musk thistle, houndstongue, salt cedar, and leafy spurge. Leafy spurge is not as widespread as Russian knapweed or other INPS in the planning area. INPS have been shown to decrease biological diversity, affect stream functions, degrade the quality of wildlife habitat, and decrease forage production for livestock and wildlife. See also the Vegetation – Invasive Nonnative Plant Species section of this document.

Nationally, about 70 percent of riparian areas have been lost (Howe et al. 2004). Although riparian areas generally account for less than 1 percent of the total land area in the western United States (Slater and Anderson 2004), the benefits of these vital oases in semiarid environments far exceed the relatively small area they occupy. Despite the relatively small area they occupy in the planning area (2,960 acres or 1 percent of the total public land surface acreage), riparian and wetland communities provide important functions, such as improving water quality, sustaining base flows, lessening the impact of floods, providing wildlife habitats, and providing forage, shade, and water for livestock (BLM 1991). Moreover, vegetation found in riparian and wetland areas influences stream communities by shading the stream (lowering water temperature), controlling dissolved nutrient inputs, stabilizing streambanks, and contributing organic matter (Moline 2004). Streamside vegetation provides cover for fish by creating quiet, shaded resting areas beneath overhanging vegetation and contributes material to organic debris jams (Wohl 2004). The roots of riparian vegetation are crucial to the development and maintenance of undercut banks that also provide cover for trout (Wohl 2004). The roots help to stabilize the streambanks, thus reducing siltation in pools and on spawning bars (Wohl 2004). Root stabilization of streambanks also allows soils to absorb extra water during spring runoff that is later released during drier months; thereby, improving late summer stream flows (WGFD 1999).

The ability of riparian and wetland areas to provide the functions described in this section depends, in part, on the interactions of water, soil, and vegetation. Due to the importance of riparian and wetland areas, the BLM performs assessments of the functional condition of these areas using a method referred to as the *Assessment of Proper Functioning Condition* (PFC) (BLM 1998a). The PFC method categorizes a site into the following functional categories: PFC, functional at-risk (FAR), or nonfunctional (NF). A site is considered to be in PFC when adequate vegetation, landform, and large woody debris are present to dissipate stream energy, filter sediment, improve water retention and groundwater recharge, develop root masses to stabilize streambanks, develop diverse habitat characteristics for fish and wildlife, and support greater biodiversity (BLM 1998a). FAR sites are susceptible to degradation and NF sites do not provide

adequate vegetation, landform, or large woody debris to dissipate stream energy; therefore, they do not provide functions, such as improving water quality and groundwater recharge (BLM 1998a).

Table 3-17 displays the functional categories of riparian and wetland communities assessed on public land surface in the planning area. Approximately 350 miles of lotic (flowing water) riparian and wetland communities and 10,000 acres of lentic (standing water) riparian and wetland communities occur within the planning area. The inventory and monitoring of these areas is an ongoing process; therefore, the classification in Table 3-17 may not fully represent current conditions.

Table 3-17. Classification and Condition of Riparian and Wetland Habitats on Public Land Surface in the Casper Planning Area

Riparian and Wetland Areas	Total	Areas Evaluated	Proper Functioning Condition	Functional At-Risk	Nonfunctional
Lotic Habitat (miles)	350	213	105	75	33
Lentic Habitat (acres)	10,000	930	877	26	27

Source: BLM 2005c

The PFC of riparian areas and wetlands is important to other resource programs and uses within the planning area, including mineral extraction; fire management; fish, wildlife, and special status species habitats; heritage resources; livestock grazing; recreation; special designations; and socioeconomic resources. For example, specific management guidelines pertaining to other resource programs include habitat improvement projects, restrictions on or prohibitions of certain activities near riparian and wetland areas, monitoring range conditions, stream improvement and use of areas by wildlife, control of INPS, and recreation guidelines. Standard #2 of the *Standards for Healthy Rangelands* (BLM 1998b) is related to riparian and wetland areas and provides a goal for all riparian and wetland areas grazed by livestock: "Riparian and wetland vegetation has structural, age, and species diversity characteristics of the stage of channel succession and is resilient and capable of recovering from natural and human disturbance in order to provide forage and cover, capture sediment, dissipate energy, and provide for groundwater recharge."

BLM's goal for riparian and wetland areas is to maintain, rehabilitate, and improve riparian ecosystems to achieve maximum long-term benefits. Management challenges for riparian and wetland communities include balancing the sometimes conflicting demands of livestock grazing and wildlife habitats; managing for PFC; water quality; avoiding improper livestock grazing, especially during dry summer months without sufficient alternative water supplies and fencing or other livestock exclusion options along riparian areas and wetlands; placing livestock supplements proximate to riparian areas and wetlands and associated potential physical and chemical impacts to terrestrial, wetland, and aquatic habitats; managing to PFC when riparian area and wetland systems typically comprise different landowners with different resource objectives; and controlling the invasion and spread of INPS. For example, some riparian or wetland areas are located on public lands in most of the larger grazing allotments in the planning area; however, these areas usually make up only a small percentage of the total riparian acreage and are almost always intermingled with private and (or) state lands. Riparian and wetland areas are often the primary, and sometimes the only, watering place for livestock. Consequently, livestock tend to congregate in these areas, especially during the hot summer season. As a result, the condition of riparian areas is one reason some grazing allotments have not met rangeland health standards (Standard #2). This and other management challenges for improving or maintaining riparian and wetland communities are addressed through management actions incorporated in the alternatives for biological resources and other resource programs and are discussed in more detail in Chapter 2.

3.4.4 Vegetation – Invasive, Nonnative Plant Species and Pest Control

The BLM works cooperatively with the State of Wyoming and the Converse, Goshen, Natrona, and Platte county weed control districts through the cooperative weed and pest management program to conserve and enhance all resources within the planning area. The Animal and Plant Health Inspection Service (APHIS) is currently the BLM's agent for pest control.

INPS are plants that are invasive and not indigenous to the planning area. Typically, INPS are detrimental to native ecosystems and human welfare. Noxious weeds are undesirable native or nonnative plants that have either been "designated" by the State of Wyoming or "declared" by the county weed control districts. For the purpose of this discussion, nonnative noxious weeds are a subset of INPS.

With the exception of vascular plants classified as INPS, a pest can be any biological life form, that poses a threat to human or ecological health and welfare. To date, and only occasionally, the Casper Field Office has dealt with grasshoppers, Mormon crickets, prairie dogs, and predator control.

There are 24 designated and prohibited noxious weeds on the State of Wyoming Weed and Pest Control Act Designated List (Wyoming Weed and Pest Council 2005a). Table 3-18 displays these 24 weeds. Table 3-19 lists the 41 INPS that are the focus of control efforts within the planning area. The INPS species in Table 3-19 represent the Declared List of Weeds and Pests in accordance with the Wyoming Weed and Pest Control Act of 1973 for Platte, Goshen, Natrona, and Converse counties.

The Wyoming State Weed Team (2003) estimated that noxious weeds and INPS inhabit 1.3-million acres in Wyoming and threaten croplands, rangelands, and natural areas. Approximately 410,400 acres of public land are infested with INPS and an estimated 952,100 acres have small or isolated populations of INPS in the planning area (BLM 2005c). Most species on the BLM's national list of INPS (www.co.blm.gov/botany/invasiweed.htm) have not invaded the planning area (BLM 2005c).

INPS often out-compete native plant species and, therefore, are considered a detriment to native vegetation. Invasion and spread of INPS in the planning area have contributed to economic loss and the loss of rangeland productivity, reduced structural and species diversity, and degraded and fragmented wildlife habitat. Based on observations and reports by the county weed control districts, INPS control measures are limiting population sizes in some cases, but not in others. Inventory and monitoring for INPS have been initiated, but currently the data are insufficient to project the rate or spread of INPS in the planning area.

Table 3-18. Wyoming Weed and Pest Control Act Designated List

Common Name
Field bindweed
Canada thistle
Leafy spurge
Perennial sowthistle
Quackgrass
Hoary cress (whitetop)
Perennial pepperweed (giant whitetop)
Ox-eye daisy
Skeletonleaf bursage
Russian knapweed
Yellow toadflax
Dalmatian toadflax
Scotch thistle
Musk thistle
Common burdock
Plumeless thistle
Dyer's woad
Houndstongue
Spotted knapweed
Diffuse knapweed
Purple loosestrife
Saltcedar
Common St. Johnswort
Common tansy

Source: Wyoming Weed and Pest Council 2005a

Note: Designated Noxious Weeds W.S. 11-5-102 (a)(xi) and Prohibited Noxious Weeds W.S. 11-12-104

Historical INPS infestations in the planning area likely began as small patches in disturbed areas because of development, fire, roadway and utility corridors, livestock concentration areas, recreation, or OHV trails. The USGS (2003b) identifies fire and grazing as important disturbance factors promoting INPS invasions. Although data are not available, the spread of initial infestations in the planning area are thought to have occurred through the transport of seeds or other propagates by wildlife, livestock, vehicles, people, water, or wind to disturbed areas. Disturbed areas are more frequent and the vegetative communities have become fragmented along the southeastern and central portion of Wyoming where historical land uses have included grazing, agriculture, and energy and mineral development (Mac et al. 1998).

Changes in vegetative frequency; construction of roads, utility corridors, and well pads; and the concentration of livestock and wildlife in some areas have exposed bare soil and provided a seedbed for the establishment of INPS in the planning area. These, as well as other historical vegetative disturbances and activities (e.g., fire, fire suppression, recreation, and OHV use) have encouraged the spread of invasive grasses and noxious weeds in the planning area (see Map 22). The combined effects of agriculture, grazing, fire, fire suppression, energy and mineral development, and, in some cases, drought, have altered the structure, composition, and site of some vegetative types within the planning area.

Table 3-19. Declared List of Weeds and Pests by Counties in the Casper Planning Area for 2005

County	Common Name
Converse County	Black henbane
	Bull thistle
	Chicory
	Common crupina
	Common mullein
	Dames rocket
	Goatsrue
	Gorse
	Iberian starthistle
	Italian thistle
	Jointed goatgrass
	Meadow knapweed
	Medusahead
	Orange hawkweed
	Phragmites
	Purple starthistle
	Rush skeleton weed
	Sandbur
	Scentless chamomile
	Scotch broom
	Sericea lespedeza
	Squarrose knapweed
	St. Johnswort
	Sulphur cinquefoil
	Syrian beancaper
	Tansy
	Tansy ragwort
	Teasel
	Wild licorice
	Yellow hawkweed
Goshen County	Puncturevine
Natrona County	Black henbane
	Curlycup gumweed
	Halogeton
	Puncturevine
	Showy milkweed
	Small burnett
	Wild licorice
Platte County	Chicory
	Cheatgrass
	Puncturevine

Source: Wyoming Weed and Pest Council 2005b

INPS in the planning area include tamarisk (salt cedar), an exotic tree or shrub that is rapidly invading riparian and wetland areas and out-competes native vegetation by utilizing its much deeper root system (up to 100-feet deep) to inhabit a larger area further from streams and open water bodies than native riparian vegetation (Tamarisk Coalition 2003). Once established, salt cedar changes soil chemistry, depletes soil nutrients and water, and increases salinity, thereby reducing the potential for and recovery of native plant species. The actual rate of spread for salt cedar and its distribution in the planning area is unknown; however, observations over time indicate that the spread of salt cedar has been rapid.

Nonnative annual grasses (particularly downy and Japanese bromes) are invading grassland, sagebrush grassland, mixed grass prairie, desert-shrub and mountain-shrub communities (Mac et al. 1998). These annual grasses are spreading rapidly into grassland and shrubland communities (BLM 2003d); however, the exact rate of spread and distribution of these nonnative grasses in the planning area is unknown (BLM 2003d). While not currently listed by the State of Wyoming as noxious weeds, nonnative annual grasses may spread into areas that have not been impacted by grazing, OHV use, or surface-disturbing activities. Areas with high densities of these annual grasses may reduce the fire return interval sufficiently to eliminate shrubs and change species composition of sagebrush communities.

Although the application of pest-control measures has been limited up to this time, it is reasonable to conjecture that issues, such as West Nile Virus, bird flu, native noxious weeds, nonnative animals, tree rusts, and so on, may be important challenges in the near future.

Cooperative Management in INPS and Pest Control

The BLM controls INPS on public lands through cooperative agreements with Converse County, Goshen County, Natrona County, and Platte county weed control districts. The BLM's resource users prepare pesticide-use proposals incorporating district INPS control guidelines (BLM 2003d). The primary species targeted for control in the planning area include Russian knapweed, spotted knapweed, diffuse knapweed, leafy spurge, Dalmatian toadflax, Canada thistle, scotch thistle, musk thistle, houndstongue, field bindweed, and puncturevine. These species are typically found in sagebrush and grassland, desert shrub, and riparian and wetland community types.

Methods used to control INPS population size and reduce density across the planning area include chemical or a combination of chemical and biological treatments. With the exception of insects that target musk thistle, spotted knapweed and diffuse knapweed, bio-control agents exhibited limited success, especially when used exclusively (BLM 2003d). Some non-native organisms introduced as biological control agents are known to diminish native biological diversity and may negatively affect populations of special status species such as Federally listed threatened or endangered species, species proposed or candidates for listing under the ESA, or Wyoming BLM's Sensitive Species List. Biological control agents that diminish native biological diversity and (or) may negatively affect populations, will not be used within the planning area. Approximately 850 acres of INPS, including the Salt Creek ACEC, are being chemically treated within the planning area annually.

The Casper Field Office also addresses weed control relating to lands and realty, wildlife, range, recreation, oil and gas, and other mineral-related actions. To date, the county weed control districts generally have been able to meet the control needs of BLM-administered lands with biological control agents and herbicides; however, the future rate of invasion and spread of INPS may exceed the districts' current capacity. Users of BLM-administered land will continue to be required to meet INPS control needs. Best preventative management practices and mitigation options for INPS are presented in Appendix X.

BLM is participating fully with five Coordinated Resource Management (CRM) working groups formed to address INPS. Four of these are located in Natrona County (South Bighorns Weed CRM, Bates Hole

Weed CRM, Badwater Weed CRM, and Rattlesnake Hills Weed CRM) and one is located in Goshen County (Goshen County Weed CRM). The CRM groups are initiating educational efforts, contemplating preventative measures, applying for outside funding, and increasing organized control efforts.

Management challenges for INPS include managing BLM-authorized activities in the planning area that disturb the soil or otherwise create an opportunity for the establishment of INPS; educating resource users regarding the spread, early detection, diminishing funding, and control of INPS; and determining effectiveness of INPS control without a completed INPS inventory and a comprehensive INPS management program. These challenges require coordination across all of the BLM's resource programs to develop, integrate, and implement aggressive management techniques and the strategies for controlling the adverse impacts and the spread of INPS in the planning area.

In the overall scheme of INPS and pest control, pest control has been a minor component. However, the integrated approach, the need for coordination, and the potential impacts to ecological and human health and welfare are equally important. Though not as active or visible as the INPS program, pest control will continue to be an integral part of INPS and pest management in the future. Management actions anticipated to address the challenges presented by INPS and pest control are incorporated in the alternatives for INPS and pest control in Chapter 2.

Fish and Wildlife Resources

The BLM is responsible for managing fisheries and wildlife habitats. Management of fish and wildlife species is overseen by state and federal wildlife management agencies. Fisheries habitat includes perennial and intermittent streams, lakes, and reservoirs that support fish through at least a portion of the year. Drainages providing fisheries habitat within the planning area are described under surface water quality in the Water section of this document and include the North Platte, Cheyenne, Powder, Wind, and Niobrara watersheds (Map 5). Within these drainages and their tributaries, aquatic habitat varies by vegetation type, water quality and quantity, land use, and landscape setting. The WGFD manages resident wildlife populations and migratory game birds within four regions (Casper, Laramie, Lander, and Sheridan) encompassing the planning area (Map 23 and Map 24). The U.S. Fish and Wildlife Service (USFWS) provides regulatory oversights for all species that are listed, proposed for listing, or are candidates for listing under the Endangered Species Act (ESA) (See Special Status Species.) The USFWS also administers the Migratory Bird Treaty Act, which protects migratory bird species whether they are hunted (e.g., waterfowl) or not (e.g., songbirds).

3.4.5 Fish and Wildlife Resources – Fish

Riparian vegetation occurs along drainages and serves to moderate water temperatures, control erosion by adding structure and stability to streambanks, provide instream habitat for fish, and provide organic material and nutrients to aquatic macroinvertebrates. Vegetation within the floodplain of drainages also serves to dissipate stream energy, store water for later release, provide areas for groundwater infiltration, and provide rearing areas for juvenile fish. In addition to physical habitat features such as vegetation, water quality also influences aquatic habitats. Specifically, water temperature, turbidity, dissolved oxygen, and total dissolved solids or salinity, determine the quantity and quality of aquatic habitats. Other factors influencing aquatic habitats in the planning area include adjacent land uses and the locations of such habitats relative to natural landscape features. Riparian and wetland habitat conditions within the planning area are further described in Vegetation – Riparian and Wetland Communities. Information on surface water bodies, water quality and water quantity, is provided in the Water section of this document.

The BLM has developed several activity plans to focus management of site-specific fisheries and aquatic habitats in the planning area, including the Bolton Creek Action Plan, Bates Creek Aquatic Habitat

Management Plan (HMP), and the Goldeneye Wildlife and Recreation Area HMP. These activity plans are in various stages of implementation. Their management focus is identified in Table 3-20 in Fish and Wildlife Resources – Wildlife. Additionally, the WGFD has developed Basin Management Plans (see Appendix E) that identify fish species present, describe the miles of stream by class and acres of standing water, and identify habitat challenges for management basins located in the planning area.

Approximately 57 fish species occur within the planning area; a few fish-bearing streams occur on BLM administered public surface due to the fragmented land ownership pattern. Most fish-bearing streams occur on lands under state or private ownership. Where fish-bearing streams do occur on public lands they generally occur on small isolated land parcels.

Special status fish species, including federally listed fish species, are discussed in Special Status Species – Fish. Species identified by WGFD as priority for management include 22 sport fish and 10 fish species classified as Native Species Status (NSS) (see Special Status Species – Fish and Appendix E). Twenty-six other fish species, not categorized as either sport or NSS, occur in the planning area. The black bullhead is classified as both NSS and sport fish.

The arid climate of the planning area, drought, and the erosive nature of flash flooding are natural events that influence the planning area's fisheries habitat conditions. Historically, agriculture, vegetation management, fire management, development, OHV use, and recreation also have influenced fisheries habitat in the planning area. Another factor affecting fisheries habitat and condition is water quality, which is regulated by the Wyoming DEQ. Historic and current water withdrawals for irrigation and other beneficial uses seasonally restrict the amount and distribution of aquatic habitats available for fisheries; however, water use in the planning area is regulated by the Wyoming State Engineer's Office and the USBR (North Platte River dam and reservoir systems only). Although irrigation and other types of reservoirs can contribute to water depletion, they also serve to trap sediment, which can degrade aquatic habitats, thereby reducing the sediment load downstream.

In addition to water depletion from historic activities (e.g., irrigation diversions), activities that result in soil compaction or erosion; increased sedimentation of streams; removal and degradation of riparian vegetation; changes in water temperature, velocity, volume, or timing of flows; and invasion of INPS in riparian corridors have altered aquatic habitats in the planning area. For example, in some riparian areas, historic livestock grazing contributed to aquatic habitat degradation through accelerated loss of streamside vegetation, compaction of soil, increased streambank erosion, and increased silt deposition. To address these historic issues and to address the health, productivity, and sustainability of BLM-administered land in Wyoming, the BLM currently employs standards and guidelines for managing public rangelands toward the following fundamentals (BLM 1998b):

- Watersheds are functioning properly
- Water, nutrients, and energy are cycling properly
- Water quality meets state standards
- Habitat for special status species is protected.

Historic vegetation removal affecting aquatic habitats, primarily occurred through agricultural conversion, fire, land development, and associated erosion and sedimentation. In some locations within the planning area, water produced during the development of oil and gas wells is discharged at the surface, undergoes chemical changes, reacts with local soils, and changes water quality; however, where this activity occurs, produced water also increases (at least temporarily) the quantity of local surface water. The drilling and completion procedures, outfalls, and quality of produced water from wells are regulated and restricted in distribution in the planning area. Wyoming BLM's policy is to not allow produced water to be used as

irrigation of public lands (BLM 2005d). Produced water is either reinjected or discharged to the surface on BLM-administered land in the planning area. The development of private lands within the planning area also contributed to effluent discharge, stream channelization, stream diversions and dams for reservoirs and power plants, and changes in water temperature and water quality.

In addition to the historic activities described above, sport fish stocking is occurring in designated multiple-use reservoirs in the planning area that are suitable for fisheries. These multiple-use reservoirs have improved public access to recreational fisheries in the planning area; however, public access continues to be limited due to the fragmented land-ownership pattern. Land-tenure adjustments currently are being pursued opportunistically to address public access.

Management challenges identified for fish in the planning area are based, in part, on historic activities and habitat conditions and trends and include habitat challenges described in Appendix E, Table E-2. Management challenges include flow management and sediment entrainment; activities contributing to reductions in streamside vegetation; management of produced water discharges; stream road crossings; maintaining PFC for lotic and lentic riparian habitats; improving floodplain connectivity; developing water sources and acquisition of water rights to benefit fisheries; public access to fisheries; herbivory and physical trampling of riparian vegetation and soil compaction by herbivores; vegetation management, including invasive species; fragmented land ownership; and water quality. Future activity plans may be identified to address these habitat challenges.

Management actions for fish generally address water sources and rights; habitat restoration, improvement, and conservation; impacts from other BLM resource program authorized activities; floodplain connectivity; land-tenure adjustments; and recreational and Special Management Areas (SMAs).

3.4.6 Fish and Wildlife Resources – Wildlife

Wildlife species throughout this document have been grouped in accordance to Wyoming Statutory Wildlife Categories to facilitate the discussion regarding these species. The remainder of this section includes a description of the existing conditions and management challenges of habitat types and statutory wildlife groups found in the planning area. Management actions are incorporated in the alternatives and described in more detail in Chapter 2. For the purpose of this discussion, the terms *habitat* and *vegetative types* are used interchangeably.

Wildlife and Habitats in the Planning Area

The planning area straddles the transitional zone between three major ecoregions: the Great Plains and Palouse Dry Steppe, the Southern Rocky Mountains, and the Intermountain Semidesert and Desert provinces (Bailey 1995). The convergence of these zones results in a diversity of vegetative types, as listed in Table 3-15 and described in more detail in the Vegetation section. Following is a brief description of wildlife associated with the vegetative types as identified in Table 3-15.

Grasslands, sagebrush, and desert shrub vegetative types dominate the planning area, with grasslands more abundant to the east and sagebrush and other shrublands more abundant to the west. Grasslands cover 3,091,173 acres, or 36 percent of the planning area (22 percent of BLM-administered land). Although dominated by grasses and forbs, the grassland vegetative type does contain some shrub species. The open grassland, sagebrush, and shrubland vegetative types are home to many raptor species, such as the Swainson's hawk, northern harrier, and prairie falcon. Raptors are attracted to the abundant prey, including upland game birds, small game, and numerous rodent species.

The sagebrush vegetative type covers 2,408,101 acres, or 28 percent of the planning area (46 percent of BLM-administered land). More than 350 species of flora and fauna depend on the sagebrush vegetative

type for all or part of their existence (Connelly et al. 2004). Sagebrush provides crucial winter range for big game and is essential for greater sage-grouse and other sagebrush obligates, such as the Brewer's sparrow, sage sparrow, and sage thrasher (Cerovski et al. 2001). Many other species utilize the sagebrush vegetative type, including a number of reptiles and invertebrates.

Due to the importance of the sagebrush vegetative type to wildlife, the WGFD, in cooperation with the BLM, is conducting habitat inventories and evaluation studies of two sagebrush habitat areas in the planning area: Bates Hole and Rattlesnake Hills (WGFD 2004a) (see Appendix E). For the Bates Hole area, WGFD calculated a utilization (i.e., browsing by livestock and wildlife) threshold of approximately 35 percent for the current year's big sagebrush production. In other words, when 35 percent or more of the current year's growth of a big sagebrush plant is utilized, detrimental impacts on individual big sagebrush plants and the big sagebrush community as a whole may occur. For 7 of 10 years (1993 to 2002), monitored by WGFD, big sagebrush plants and communities exhibited excessive utilization and detrimental impacts. The WGFD study also determined that spring (April-June) precipitation patterns play an integral role in big sagebrush production.

The WGFD monitoring of big sagebrush plants and communities in the Rattlesnake Hills area identified a 35-percent utilization threshold for the current year's growth of big sagebrush. Moreover, contrary to the Bates Hole study, results of the Rattlesnake Hills 9-year (1994 to 2002) study revealed that only 2 of the 9 years exhibited excessive utilization of the current year's production or detrimental impacts to big sagebrush plants and communities. However, during 1 of these 2 years (2000), the WGFD documented a dramatic increase in utilization of the current year's growth of big sagebrush, primarily from wintering domestic sheep.

Compared to grasslands and sagebrush, forest and woodlands are less abundant in the planning area; however, they add structural and biological diversity to the landscape. The Casper Field Office administers approximately 165,004 acres of forests and woodlands (see Table 3-16). Vegetative types included in the forest category include ponderosa/lodgepole pine with Douglas fir and subalpine fir at higher elevations and moister sites. Woodlands include limber pine, Rocky Mountain juniper, and quaking aspen. Forest and woodlands provide summer cover for big game and are prime habitats for American marten, blue grouse, and northern goshawks. Calliope hummingbird, Williamson's sapsucker, Townsend's warbler, and brown creeper also are species of interest (Cerovski et al. 2001). Aspen is another vegetative type included in the woodlands category and represents an important component of biodiversity in the planning area. Aspen stands typically have a diverse understory component and, thus, provide abundant forage and cover for big game, particularly females with young. Aspen also supports an abundance and diversity of animal species, including birds such as the blue grouse, red-naped sapsucker, and warbling vireo. Some locations within the planning area have experienced a decline in aspen. Fire management, land development, climate, and ungulate grazing continue to affect the quantity and distribution of aspen in the planning area.

Mountain shrubs cover 204,218 acres, or only 2 percent of the planning area (approximately 3 percent of BLM-administered land). Most of this vegetative type is dominated by xeric species, such as true and curl-leaf mountain mahogany and antelope bitterbrush. Other common species are chokecherry, snowberry, currant, Wood's rose, and serviceberry. Mountain shrub communities provide important forage, hiding, or thermal cover for a variety of wildlife, including deer and elk, nongame birds, and small mammals. A second shrub vegetative type occurring within the planning area is the arid desert shrubs and saltbush-greasewood flats. Although not regarded as highly palatable to most species, pronghorn do forage on greasewood and mule deer use this vegetative type as spring habitat.

Riparian and wetland vegetative types occur on less than 1 percent of the public lands within the planning area; however, it is estimated that 70 to 85 percent of Wyoming's wildlife use riparian habitats for at least

a portion of their life-cycles. Many amphibian species, as well as muskrat, beaver, mink, and various waterbirds and waterfowl, occur in riparian or wetland areas only. Songbirds are attracted to the structural and vegetative diversity for both nesting and migrating habitat (Knopf et al. 1988). The Wyoming Partners in Flight have categorized riparian habitats as a top priority for conservation of neotropical migrant birds (birds that breed in the United States and Canada and winter in Latin America) (Cerovski et al. 2001). The various lakes, reservoirs, streams, and associated riparian vegetation provide food, cover, and travel corridors for a variety of wildlife species. The proximity of aquatic habitats to wetland and upland habitats, provide breeding, migratory, winter, or year-round habitats for numerous waterfowl. Diving ducks, such as mergansers and goldeneye, require open and deep water that supports fish and aquatic insects. Dabbling ducks, such as mallards and teal, require migration and winter habitats with a mix of open water for loafing and emergent vegetation for food and cover. Quality breeding habitats for mallards and teal exhibit nesting cover sufficiently close to water bodies to support emergent vegetation for secure cover. In addition, young ducklings require an abundant supply of aquatic insects for food.

The BLM developed HMPs for site-specific areas within the planning area containing one or more of the vegetative types described above that have the potential for improvement. For these areas, the Casper Field Office uses HMPs to focus management on habitat conservation and improvement for fish and wildlife species. Table 3-20 summarizes the name, approximate size, and management focus of existing HMPs for the planning area.

Table 3-20. Habitat Management Plans for the Casper Planning Area

Habitat Management Plan	Acres	Management Focus
33-Mile Reservoir HMP (BLM 1974a)	149	Waterfowl and shorebird habitats
Bald Eagle HMP for the Platte River Resource Area and Jackson Canyon ACEC (BLM 1992a)	3,938	Bald eagle habitats
Bates Creek Aquatic HMP (BLM 1973)	1,350	Fisheries habitats
Bates Creek Reservoir HMP (BLM 1972a)	1,823	Waterfowl habitats
Bishop Waterfowl HMP (BLM 1972b)	119	Waterfowl habitats
Bolton Creek Action Plan (BLM 1988b)	437	Riparian habitats
Ferris-Seminoe HMP (BLM 1983)	Approximately 50,000	Wildlife and fisheries habitats
Goldeneye Wildlife and Recreation Area (BLM 1978)	894	Fisheries, wildlife, and recreation
Laramie Peak Big Horn Sheep HMP (BLM 1995a)	Approximately 10,000	Bighorn sheep habitats
Teal Marsh Reservoir HMP (BLM 1974b)	117	Waterfowl habitats

Acreage includes lands administered by the BLM only.

ACEC Area of Critical Environmental Concern
BLM Bureau of Land Management
HMP Habitat Management Plan

Historic activities from agriculture, development, fire management, OHV use, recreation, and transportation, have, in some areas, contributed to the degradation of wildlife habitats in the planning area. In other instances, historic activities have improved habitats or the ability to manage wildlife habitats. Examples of historic activities that have contributed to the degradation of wildlife habitats include livestock concentration areas (e.g., water sources), which have trampled and removed vegetation and compacted soil; utility and pipeline corridor installation, which has disturbed soil and provided opportunities for the spread of INPS; fire suppression, which has depleted or completely removed the natural fire regime with which habitats evolved; oil and gas well and associated infrastructure development, which has disturbed soil for well pad and road development, thereby contributing to soil erosion and habitat fragmentation; improper OHV use, which has spread INPS and disturbed wildlife; recreation activities, which have disturbed wildlife; and road placements, which have contributed to

habitat fragmentation in the planning area. The historic activities mentioned above have occurred to various degrees and primarily in isolated areas within the planning area. Consequently, current wildlife habitats in the planning area exhibit a range of existing conditions from habitats in PFC to habitats in something less than PFC and from large, contiguous blocks of habitats to small, fragmented patches of habitats. Examples of historic activities that have improved wildlife habitats or improved the management of habitats in the planning area include prescribed fire to maintain or restore desirable vegetative types and restore a natural fire regime; livestock water developments as sediment traps and as water sources for native ungulates and other wildlife; use of OHVs to manage and monitor wildlife habitat in remote locations within the planning area; and granting of public access for hunting as a tool for big game management.

BLM and WGFD guidance documents are available regarding Best Management Practice (BMPs) and management of wildlife habitats (WGFD 2004b; BLM 2005g). Although not as specific in management focus as the HMPs and action plans identified above, the existing plan does guide the BLM's overall management of wildlife habitats within the planning area. Due to the relationship between wildlife habitats managed by BLM and wildlife species managed by the WGFD, a statewide agreement was established to facilitate cooperation between these agencies relative to wildlife (WGFD and BLM 1990). In accordance with the cooperative relationship between these agencies, the following description of priority wildlife species in the planning area is organized by Wyoming statutory categories: big game, trophy game, furbearers, predatory animals, small game, game birds, migratory game birds, and nongame (raptors, neotropical migrants, mammals, and reptiles and amphibians).

Big Game

The planning area contains 1,124,830 acres of designated crucial winter range for big game, 25 percent (281,158 acres) of which occurs on lands managed by the BLM (Map 23 and Map 24). As shown in these maps, crucial winter ranges for some big game species overlap. Winter is a crucial and stressful time for wild ungulates; therefore, crucial winter range for the most abundant big game species (pronghorn, mule deer, and elk) is often the focus of management and a criteria for analyzing the impacts of resource management on big game. The WGFD herd units for big game are shown in Figures 3-6, 3-7, and 3-8. Pronghorn, deer, and elk are migratory, generally moving to a winter range during November and remaining there until April or May. Current management prohibits surface development from November 15 through April 30 in all big game crucial winter ranges in the planning area. Although specific characteristics of winter ranges may vary, essential factors are the quantity and quality of available forage (Short 1981). Winter ranges typically occur on relatively low-elevation shrubsteppe habitats (Carpenter and Wallmo 1981), which support nutritious browse plants that are accessible above snow cover. Pronghorn, mule deer, and elk avoid deep snow, which can cover preferred winter forage and inhibit escape from predators (Wilson and Ruff 1999). Important winter browse in the region includes big sagebrush, mountain mahogany, rabbitbrush, bitterbrush, and serviceberry (Kufeld et al. 1973).

Basic requirements of summer ranges are thermal and visual cover and adequate forage, particularly for females with young. Summer ranges for mule deer occur in shrublands and in aspen and juniper woodlands. Woody riparian areas are important year-round for mule deer. Elk tend to move to higher-elevation aspen and conifer woodlands during summer. Adjacent upland meadows, sagebrush and mixed grass, and mountain shrub habitats are used for foraging. Woody riparian corridors often are important for hiding cover and forage during migration periods.

The planning area encompasses all or part of 41 big game populations or herd units (12 pronghorn, 15 mule deer, 3 white-tailed deer, 10 elk, and 1 bighorn sheep). Established population size "objectives" guide management strategies for each big game herd unit. These objectives are established by the WGFD through a public and interagency review and input process and are set at a biologically sustainable and

socially acceptable level. Appendix E contains a table that summarizes the current population objective, current population estimate, population trend, percent of BLM-administered land, and the management challenges for each herd unit (WGFD 2005a). Much of the affected environment description for big game and trophy game was provided by WGFD (2005b).

Management challenges for big game species include poor habitat conditions, fire management, drought, increased development and urbanization, habitat fragmentation, OHV misuse, disease, and the impacts of livestock grazing on the frequency, quality, and composition of key forage species (Appendix E). The BLM and the WGFD continually coordinate and evaluate actions affecting herd units and habitat conditions to determine appropriate management direction. Currently, Chronic Wasting Disease (CWD) is present in deer and elk populations throughout the planning area. Another emerging management issue for big game is the placement and use of livestock forage supplements that may contain chemicals toxic to wildlife. The impacts of these issues at the population level are not well understood.

Figure 3-6. WGFD Pronghorn Herd Units within the Casper Planning Area

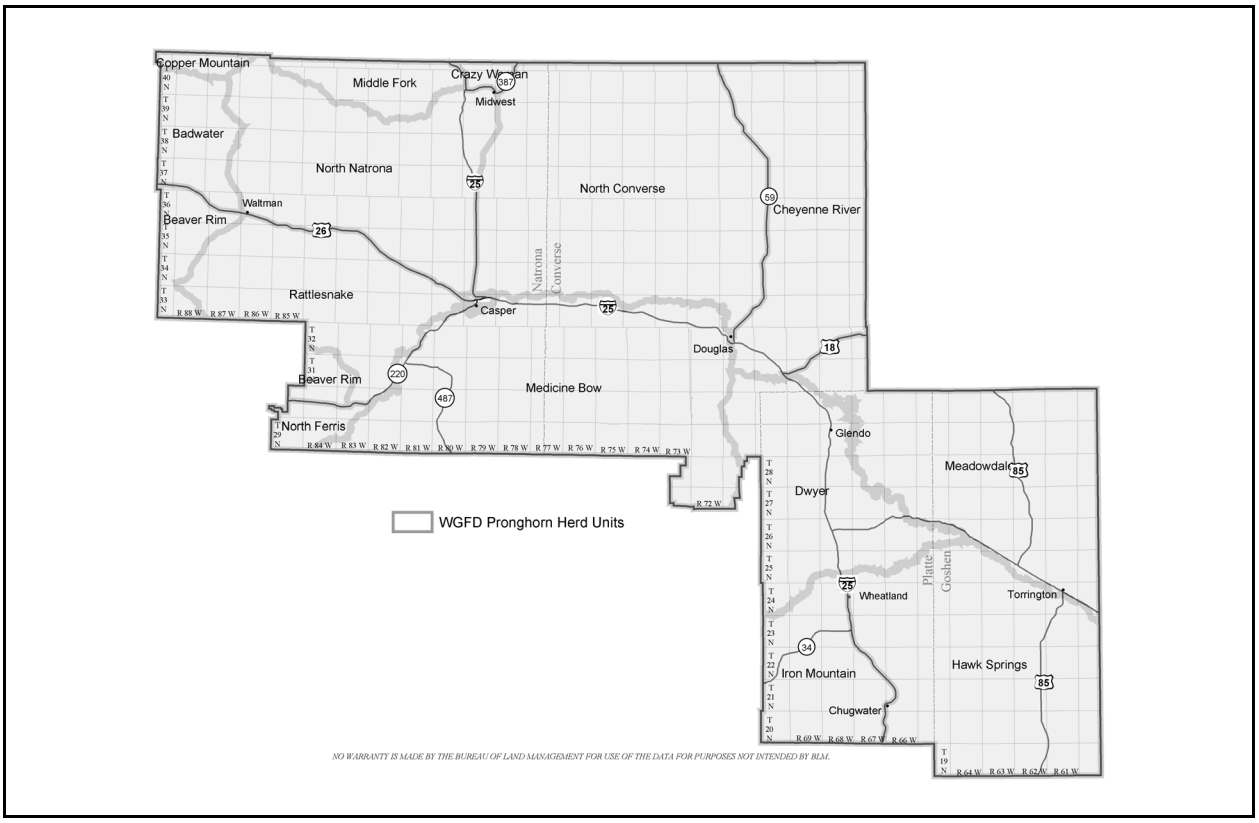


Figure 3-7. WGFD Mule Deer Herd Units within the Casper Planning Area

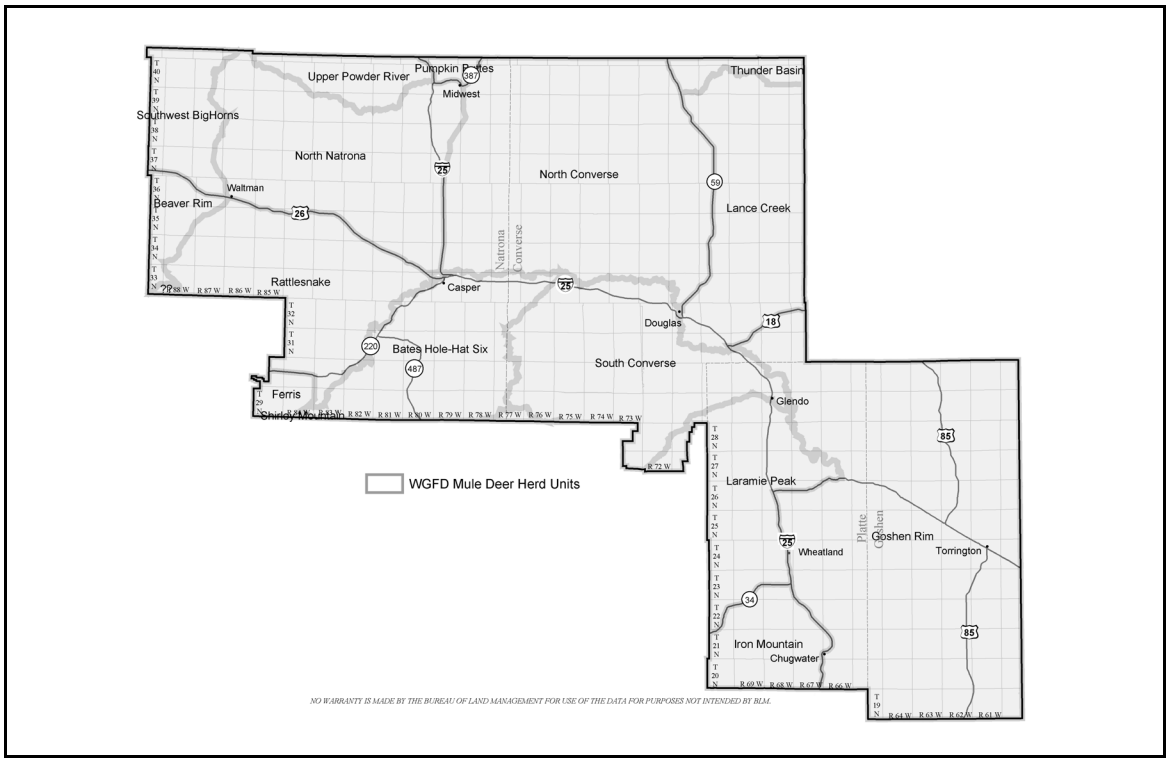
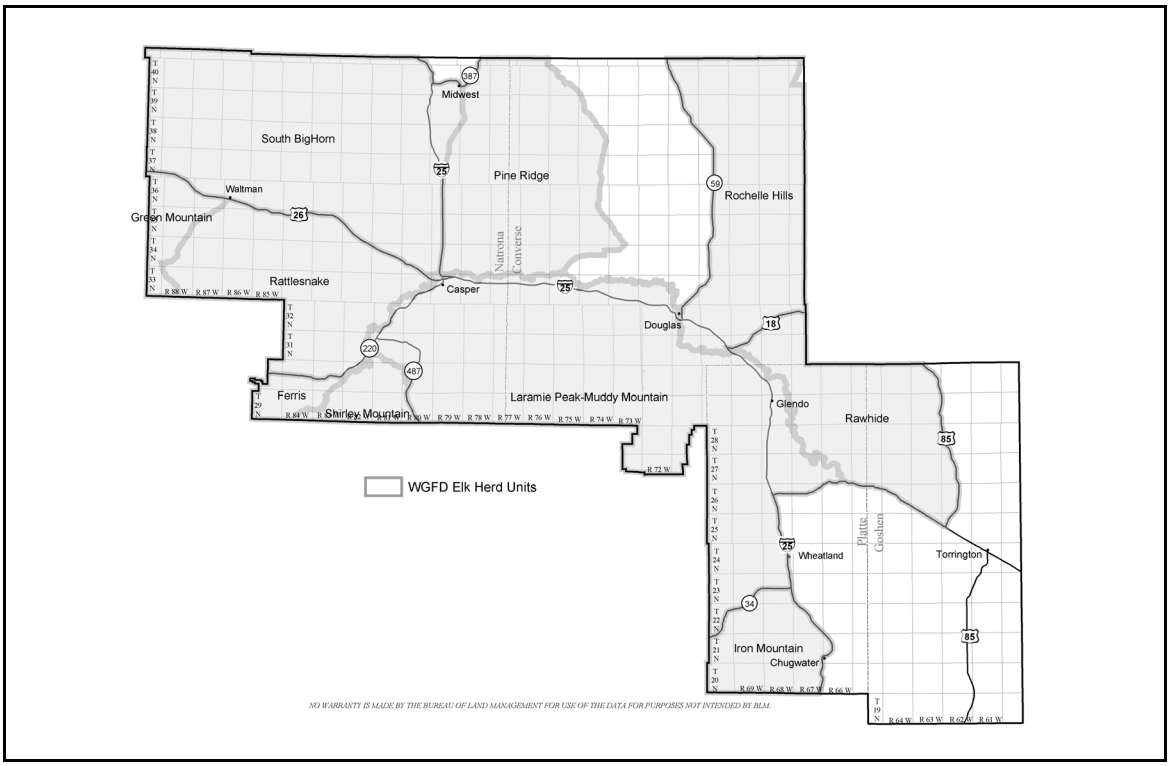


Figure 3-8. WGFD Elk Herd Units within the Casper Planning Area



Pronghorn and Mule Deer

Population sustainability of pronghorn and mule deer at their objective level depends, in part, on habitat quality, quantity, and availability on public lands. Currently, 9 of 12 (75 percent) pronghorn and 13 of 15 (87 percent) mule deer populations within the planning area are below objective (see Big Game Herd Unit Summaries, Appendix E). Overall, winter habitat conditions for pronghorn and mule deer are in poor condition due to a variety of reasons (see Sagebrush monitoring, Appendix E) resulting in poorer fawn production, survival, and recruitment, and, thus, lower population levels. Over the past 10 years, it has become apparent, in many herd units, that habitat conditions cannot sustain pronghorn or mule deer numbers at the current levels. The BLM and the WGFD have cooperatively developed and implemented a number of habitat enhancement projects to reduce this trend. In addition, the WGFD is reviewing population objectives and management options to address habitat and population concerns.

Of the 496,929 acres of pronghorn crucial winter range in the planning area, 114,920 acres (approximately 23 percent) occur on BLM-administered land surface. Similarly, of the 635,155 acres of mule deer crucial winter range in the planning areas, 170,716 acres (approximately 27 percent) occur on BLM-administered land surface. Many of the pronghorn and mule deer populations in the planning area experienced large-scale die-offs during the winter of 1983-1984. Populations recovered, but during the winter of 1992-1993, pronghorn and mule deer experienced another year of winter mortalities. In 2000, the onset of a severe drought and its impact on the rangelands has hampered the populations' abilities to recover. As a result, populations remain below levels observed in the early 1990s.

Elk

Unlike pronghorn and mule deer, elk populations have thrived. Of the 10 elk herd units within the planning area, 7 are above objective and 1 is at objective. Of the 130,209 acres of elk crucial winter ranges in the planning area, approximately 33,630 acres (26 percent) occur on land surface administered by the BLM. In general, elk populations have increased throughout the planning area over the last 15 years. CWD has been documented in some of the elk herd units within the planning area. The impacts of this disease at the population level are not thought to be a significant factor for elk; however, these impacts are not completely understood.

White-Tailed Deer

White-tailed deer populations in the planning area are healthy and occupy cottonwood galleries and riparian habitats mostly on private lands near riverine corridors. Of the three white-tailed deer herd units within the planning area, one herd has a population objective. In the remaining two herd units, population dynamics is not managed actively due to preponderance of private lands. In general, white-tailed deer have increased throughout central and eastern Wyoming over the last 15 years. White-tailed deer populations continually fluctuate due to Epizootic Hemorrhagic Disease outbreaks.

Bighorn Sheep

As a result of introductions from Whiskey Mountain in the early 1970s and late 1980s, Rocky Mountain bighorn sheep (*Ovis canadensis canadensis)* are found in the Laramie Range. This population did quite well for several years after the introductions, but has experienced an overall decline during the past 15 years. This is not surprising and has been observed in other similar introduction efforts. Also, there has been a dramatic shift in distribution of sheep from "traditional" habitats to areas further south that were more or less unoccupied. It is likely the bighorn sheep that originally occupied suitable habitats in the planning area were the now extinct subspecies *Ovis canadensis auduboni*. This subspecies was well adapted to the smaller, xeric mountain ranges in central and southeastern Wyoming. The WGFD indicates that future introductions of bighorn sheep in this area should focus on the California bighorn sheep (*Ovis canadensis californiana*). This subspecies is nonmigratory, utilizes a greater proportion of

browse in its diet, and occupies environments similar to suitable habitats (i.e., Box Elder Canyon, Glendo Canyon, and Fremont Canyon) in the planning area. The Laramie Peak Bighorn Sheep Herd is the only bighorn sheep herd unit within the planning area. This herd is believed to be below objective, although no accurate population estimate exists. Of the 13,598 acres of bighorn sheep crucial winter range in the planning area, 789 acres occur on BLM-administered land. In 1995, the BLM entered into a Memorandum of Understanding (MOU) for the preparation of the Laramie Peak Bighorn Sheep HMP to conduct a series of vegetative treatments and management actions aimed at increasing sheep population. The BLM will continue to support future bighorn sheep introduction efforts by the WGFD.

Trophy Game

Trophy game, found on BLM-administered land in the planning area, include black bear and mountain lion. Black bears occur within the planning area and primarily inhabit forested habitat types (i.e., Laramie Range, Muddy Mountain, and the South Bighorns) at higher elevations. These areas are encompassed in the WGFD's Laramie Peak bear management unit (BMU) and the Bighorn BMU. Due to a bear's secretive nature, population estimates are difficult to obtain and population objectives are not established. The BLM and WGFD utilize management guidelines established by the WGFD's Black Bear Management Plan (WGFD 1994) to help direct management activities on BLM-administered land.

Mountain lions reside throughout the planning area; however, they are more common in areas associated with the canyons and foothills of mountain ranges (i.e., Laramie Range, Rattlesnake Hills, the South Bighorns, and the Pine Ridge) where mule deer concentrate. Lions within the planning area are encompassed in the WGFD's southeast lion management unit (LMU), the Bighorn LMU, the north-central LMU, and the southwest LMU. Similar to black bears, population estimates for mountain lions are difficult to obtain. Mountain lion harvest levels are monitored; management direction for this species may be adjusted based on the age and gender structure of harvested animals.

Management challenges for trophy game are similar to those discussed for big game. In addition, bear baiting around developed recreation areas poses an ongoing management challenge.

Furbearing Animals

Furbearing animals in the planning area include badger, beaver, bobcat, marten, mink, muskrat, and weasel. Badger, bobcat, and weasel are habitat generalists, occupying all vegetative types in the planning area with appropriate prey base. Marten primarily utilize mixed-conifer forest and aspen communities within the ponderosa and lodgepole pine forests and the aspen, juniper, and limber pine woodlands vegetative types. Beaver, muskrat, and mink typically are found in the aspen and riparian and wetland vegetative types.

Management challenges for beaver on BLM-administered lands are of two types: (1) restoring or maintaining beaver in riparian and aquatic communities, and (2) controlling beaver damage to other resources. Beaver can be beneficial in restoring degraded riparian and aquatic systems by raising the water level and helping to maintain high water tables, thereby encouraging recovery of hydrologic functions and reestablishment of riparian vegetation. Conversely, beaver can remove trees in well-established riparian systems and cause damage to facilities (e.g., damming road culverts, irrigation ditches, etc.).

Due to the wide distribution of other furbearing animals throughout Wyoming, no management challenges have been identified in the planning area. The primary management effort by the BLM is directed at maintaining the continuity of ecosystems in the planning area.

Predatory Animals

According to Wyoming statute, predatory animals include coyote, jackrabbit, porcupine, stray cat, gray wolf, red fox, raccoon, and skunk (striped and spotted). All but the gray wolf can be found in the planning area. From the standpoint of BLM management, most of the efforts and attention are focused on coyote, red fox, and skunk animal damage-control activities. BLM does not conduct any habitat management activities for predatory animals.

Predatory animal damage-control activities on public lands are conducted by the U.S. Department of Agriculture APHIS-Wildlife Services in accordance with the national MOU and local action plans (BLM 1994a; BLM 1997a; BLM 1995b; BLM 2000c). These activities are conducted in response to requests from individuals, organizations, and agencies experiencing damage caused by wildlife. Animal damage-control activities primarily include mechanical (trapping, shooting, and denning), chemical (poison), and nonlethal methods (noise devices, aversive conditioning, etc.). Through the Animal Damage Management Board, the State of Wyoming also conducts animal damage-control activities, particularly those actions involving rabies and other diseases.

The management challenges of animal damage-control activities are to conduct a program that responds to predation problems and remains socially acceptable and safe in accordance with applicable laws and regulations.

Small Game

Small game in the planning area include the cottontail rabbit, snowshoe hare, red squirrel, fox squirrel, and gray squirrel. Cottontail rabbits are habitat generalists, occupying all vegetative types in the planning area. Snowshoe hare and red squirrel primarily utilize mixed-conifer forest and aspen communities within the ponderosa and lodgepole pine forests and the aspen, juniper, and limber pine woodlands vegetative types. Fox and gray squirrel typically occur in deciduous gallery forests. Populations of all small game species tend to be cyclic in nature.

Due to the wide distribution of small game species throughout Wyoming, no management challenges have been identified in the planning area. The primary management effort by the BLM is directed at maintaining the continuity of ecosystems in the planning area.

Game Birds

Game bird management direction for the BLM is identified in the BLM and Fish and Wildlife 2000 Upland Game Bird Habitat Management Plan (BLM 1992e). All game bird species in Wyoming are managed for recreational use (e.g., hunting, bird watching, etc.).

Game birds include the greater sage-grouse, ring-necked pheasant, blue grouse, wild turkey, sharp-tailed grouse, Hungarian partridge, and chukar partridge. Greater sage-grouse are discussed in the Special Status Species – Wildlife section. The ring-necked pheasant is a game farm bird in Wyoming and generally occupy river-bottom agricultural lands and adjacent habitats on which BLM has minimal management authority. The majority of the ring-necked pheasant population in the planning area occurs in Goshen County. Blue grouse typically utilize mountain and foothill forested habitats and are primarily found in the Laramie Range and Southern Bighorn Mountains of the planning area. Wild turkey generally are associated with river-bottom habitats and in the pine savannahs and foothills throughout the planning area. Sharp-tailed grouse, Hungarian partridge, and chukar partridge occupy grassland habitats within the planning area. Sharp-tailed grouse tend to be associated with sites dominated by native grasslands and woody draws, while Hungarian partridge are often associated with agricultural strip farming and mountain shrub communities. Habitats for the Chukar partridge typically are broken topography and steep terrain. Current management restricts or prohibits surface occupancy within ¼ mile

of a sharp-tailed grouse strutting/dancing ground and does not allow surface use within 1-¼ mile of the ¼-mile protection zone between March 1 and June 15. The BLM's authorized officer may grant exceptions to both restrictions.

Management challenges focus on maintaining or enhancing the presence of game birds and the habitats upon which they depend. Management actions for game birds generally are directed at activities around delineated breeding and nesting habitats (e.g., sharp-tailed grouse leks). Some opportunities for wild turkey introductions in cooperation with the WGFD may exist in the planning area.

Migratory Game Birds

Migratory game birds in the planning area include waterfowl, mourning dove, and sandhill crane. Sandhill cranes typically occupy similar habitats as waterfowl. In Wyoming, mourning doves are typically associated with river-bottom lands and agricultural areas that provide necessary food, water, roosting, and breeding areas. BLM-administered public lands typically provide limited habitats for migratory game birds. These habitats generally are associated with water bodies and riparian and wetland areas that provide suitable nesting or roosting sites. Several HMPs have been developed on public lands in the past to increase the quantity and quality of these habitats; however, the majority of these habitats occur on state and private lands.

In general, small wetlands represent the most available habitats to waterfowl during spring and early summer. More permanent wetland habitats (e.g., large marshes, lakes, and reservoirs) and agricultural fields are used by migrating game birds during fall migration. Open river channels, warm water canals, tailraces below reservoirs, and agricultural habitats are used during the winter.

Water availability and water quality are two habitat parameters that influence waterfowl use of a site. The current drought in Wyoming has reduced wetland habitat quantity and quality within the planning area. Moreover, poor vegetation growth associated with the drought has reduced residual cover for upland nesting ducks. Like other states, Wyoming struggles with the degradation of wetland and adjacent upland habitats due to increased urbanization, agricultural conversion, and improper livestock grazing practices.

During most years between 1952 and 1999, the WGFD flew a May duck breeding ground survey. Based on these counts, Wyoming was ranked sixth in duck production among the states. However, the May duck counts did not correlate with the low number of duck broods in the state during July. Recent research by the cooperative unit at the University of Wyoming indicates that ducks that do nest in Wyoming are productive; disproving a hypothesis, that Wyoming was a duck sink. An alternative hypothesis for the high number of ducks during April and May is that Wyoming provides good spring migration habitats for ducks during good water years. Of the 58 May survey sampling units flown in Wyoming, 6 were within the planning area.

The planning area includes parts of two joint venture areas (Intermountain West and Northern Great Plains). Ducks Unlimited has developed a national conservation plan (Ducks Unlimited 2004) that addresses waterfowl management needs, including those in Wyoming. In addition, several HMPs have been developed for the planning area to address site-specific areas of waterfowl habitats (see Table 3-20). The BLM will continue to look for opportunities to develop and enhance migratory bird habitats within the planning area.

Historic activities in watersheds that have contributed to loss or degradation of habitat in the planning area include recreation, agriculture, forest management, fire management, urbanization, and land development. Management of wetlands and riparian areas in this arid climate continues to be a challenge. Other challenges include access to public lands during breeding season, contaminants, INPS, and water quantity and quality.

Nongame

Existing conditions for four categories of nongame wildlife (raptors, neotropical migrants, mammals, and reptiles and amphibians) are briefly described below. Raptors and neotropical migrants are afforded protection under the Migratory Bird Treaty Act. Additional detail about nongame wildlife occurring with the planning area can be found in the WGFD's *Atlas of Birds, Mammals, Amphibians and Reptiles in Wyoming* (WGFD 2004c). Additionally, the Wyoming Partners in Flight's Wyoming Bird Conservation Plan identifies priority bird species and habitats, as well as population and habitat objectives for birds (Nicholoff 2003).

Raptors

Raptors include eagles, hawks, owls, falcons, and vultures. Ten species of diurnal raptors and five species of owls are known or suspected to occur within the planning area. Nine of the 10 raptor species breed in Wyoming; the remaining species—the rough-legged hawk—is a winter resident. Four of the owl species are year-round residents in the state, while the snowy owl is only a winter resident. Raptors can be found collectively in all vegetative types in the planning area. Table 3-21 summarizes the potential number of raptors and nongame bird species in the planning area.

Table 3-21. Summary of Potential Number of Raptor and Nongame Bird Species in the Casper Planning Area

Season/Time of Year	Number of Diurnal Raptor Species	Number of Owl Species	Number of Nongame Bird Species	Total Nongame Avian Species
Breeding/Year-round	9	4	127	140
Winter/Migration	1	1	41	43
Total	10	5	168	183

Source: WGFD 2005c

Management direction for the BLM is identified in the BLM and Fish and Wildlife 2000 Raptor Habitat Management Plan (BLM 1992b). Management procedures and activities for raptors have been identified by the USFWS management guidelines (USFWS 2002a) and Avian Protection Plan guidelines (APLIC and USFWS 2005). The Wyoming Partners in Flight Wyoming Bird Conservation Plan Version 2.0 identifies habitat requirements and threats for raptor species (Nicholoff 2003). Currently, approximately 2,000 raptor nests have been documented in the planning area. Not all of these nests are occupied, however, the BLM and the WGFD regularly survey and monitor raptor nest activity.

Management challenges for raptors generally are directed at activities around nesting habitat, concentration sites (e.g., winter roosts), and foraging areas. Management of powerlines and contaminants for raptor conservation are ongoing issues in the planning area. Emerging issues for raptors in the planning area are wind-energy development and the impacts of the West Nile Virus on raptor populations.

Neotropical Migrants

For the purposes of this RMP, neotropical migrants include birds that breed in the United States and Canada and winter in Latin America (Nicholoff 2003). The terms "neotropical migrants" and "nongame birds" are used interchangeably for this discussion. Neotropical migrant management direction for the BLM is identified in the BLM Fish and Wildlife Nongame Migratory Bird Conservation Plan (BLM 1992c) Wyoming Partners in Flight Wyoming Bird Conservation Plan Version 2.0 provides habitat requirements for neotropical migrant species and identifies their threats (Nicholoff 2003).

Approximately 168 nongame bird species are known or suspected to occur within the planning area. This includes waterbirds, shorebirds, marshbirds, and a range of songbirds, both residents and neotropical

migrants. More than120 of these species breed in Wyoming and more than 40 rely on habitats within the state during migration. A few species, such as the snow bunting and American tree sparrow, migrate to Wyoming in the autumn and remain during the winter. Preferred habitats for these species range from sagebrush and grasslands to marshes and wetlands to coniferous and deciduous forests. These species collectively utilize all of the vegetative types in the planning area.

Management challenges focus around maintaining or enhancing the presence of these species and the habitats upon which they depend. Management actions for neotropical migrants generally are directed at activities around nesting habitat and migration corridors. Ongoing conservation issues for neotropical migrants include managing hazards such as powerlines, communication towers, contaminants, and wind turbines.

Mammals

Twenty-nine species of nongame mammals are known or suspected to occur within the planning area (WGFD 2005d) (see Table E-4 in Appendix E). For a complete habitat description and distribution of nongame mammals, refer the *Atlas of Birds, Mammals, Amphibians, and Reptiles in Wyoming* (WGFD 2004c). Most nongame mammals are widely distributed in the state, and although the population trends are unknown, they are believed to be stable. Population trend data and specific habitat requirement information are lacking for many of these species.

Four bat species (eastern red bat, hoary bat, silver-haired bat, and the eastern pipistrelle) potentially occurring within the planning area are considered a management priority. Although these species utilize a wide variety of habitats, caves and abandoned mines represent important habitat components upon which these species depend for roosts, nurseries, and hibernacula. No specific habitat components have been delineated on public lands in the planning area.

Management challenges currently focus on increasing the understanding of habitat requirements for these species and maintaining the presence of these species in occupied habitats. Ongoing conservation efforts for nongame mammals include INPS and managing hazards, such as contaminants and developments.

Reptiles/Amphibians

WGFD (2004c) documents the locations of past observations of reptiles and amphibians in the planning area. In general, reptiles occurring in the planning area occupy a variety of habitats including aquatic (turtles); rock outcrops (lizards); and a variety of terrestrial vegetative types (snakes and lizards).

Amphibians occurring in the planning area occupy aquatic habitats, including springs, wetlands, riparian corridors, or open water for the first phase of their life-cycle. Amphibians potentially occurring in the planning area include tiger salamanders, toads, and frogs.

Population data for reptiles and amphibians in the planning area are unknown. Management challenges for reptiles and amphibians primarily include maintaining a variety of habitat types and components (e.g., rock outcrops) in proximity to provide for the requirements of these species.

Special Status Species

Lists of special status species are maintained under federal and state authority, including a March 1990 MOU between the WGFD and Wyoming BLM (WGFD and BLM 1990). The purpose of the MOU is to strengthen the cooperative approach to the management of wildlife and wildlife habitat on public land between the two agencies and to encourage them to work together to develop, enhance, maintain, and manage wildlife resources, including planning and sharing data concerning biological resources.

The BLM Wyoming Sensitive Species Policy and species list is provided in an annually updated memorandum (BLM 2002d; USFWS 2004c). The goals of BLM Wyoming policy regarding special status species follow:

- Maintain vulnerable species and habitat components in functional BLM ecosystems.
- Ensure special status species are considered in land-management decisions.
- Prevent a need for species listing under the ESA.
- Prioritize needed conservation work with an emphasis on habitat.

The USFWS provides regulatory oversight for all species that are listed, proposed for listing, or are candidates for listing under the ESA. The USFWS also administers designation of critical habitat for listed species and the Migratory Bird Treaty Act, which protects migratory bird species whether they are hunted (e.g., waterfowl) or not (e.g., songbirds).

Special status wildlife species are governed under BLM Manual 6840 (BLM 2001d). The goals and objectives of this policy are to (1) conserve listed species and the ecosystems on which they depend and (2) ensure that actions requiring authorization or approval by the BLM are consistent with the conservation needs of special status species and do not contribute to the need to list special status species either under the provisions of the ESA or BLM Manual 6840. In addition, management actions for federally listed species are often derived through the consultation process (i.e., Section 7 of the ESA). Currently, the Casper Field Office determines presence of special status plant species on a case-by-case basis. Restrictions in areas with known populations of special status plants are also determined on a case-by-case basis. The Wyoming Natural Diversity Database (WYNDD) maintains a list of Wyoming plant species of special concern and provides information on global and state abundance, legal status, and state distribution. Species in Wyoming are considered to be of special concern if (1) the species is vulnerable to extinction at the global or state level due to inherent rarity, (2) the species has experienced a significant loss of habitat, or (3) the species is sensitive to human-caused mortality or habitat disturbances.

The Casper Field Office is responsible for managing habitat, while management of special status wildlife and fish species is overseen by state and federal wildlife management agencies. The WGFD manages resident special status wildlife populations and migratory game birds within four regions (Casper, Laramie, Lander, and Sheridan) encompassing the planning area. These four regions are displayed on Maps 23 and 24.

3.4.7 Special Status Species – Plants

The Casper Field Office also is responsible for managing habitat for special status plant species. Special status species considered in this analysis are those listed as threatened or endangered, those proposed for listing or are candidates for listing under the provisions of the ESA, or those designated by the BLM State Director as sensitive.

Nine special status plant species are known to or may occur within the planning area. One species is endangered, two are threatened, and the other six are designated as BLM sensitive species. Blowout penstemon is endangered, and Colorado butterfly plant and the Ute ladies'-tresses are threatened. A tenth species, the western prairie fringed orchid, a threatened species, could be affected by management actions in the planning area; however, it is only known to occur in riparian areas in watersheds downstream of the planning area and beyond the Wyoming border. Critical habitat for the Colorado butterfly plant was designated in 2005 on 107 acres of private land (Unit 1: Tepee Ring Creek) in Platte County within the planning area (USFWS 2005a).

Special status plants are found within a variety of habitats in the planning area. The landscape in the area exhibits diverse climates, topography, soils, and rock cliffs and outcrops. Within this complex, habitats for special status plant species range from valley-bottom riparian areas along the North Platte River to montane outcrops and forests. Table 3-22 presents habitat associations for special status plants that are known to or may be found on land managed by the Casper Field Office. Due in large part to their rarity, precise information regarding the location and number of populations of special status plant species in the planning area, the percent of populations occurring on public lands, the number of individual plants in each population, and the condition of each population (habitat quality) on public land in the planning area, is not available. The Casper Field Office continues to collect or have data collected to address these limitations as funding allows. A brief description (see below) of trends, occurrence, and threats to these special status plant species precedes the table. Unless otherwise stated, sources of information on the status, distribution, and threats for special status plant species in this sectioin are Keinath et al 2003 and NatureServe 2006.

Laramie columbine (BLM Sensitive)

Laramie columbine is ranked as an imperiled species at the state and global levels based on rarity and vulnerability to extinction. Although no intensive surveys have been conducted for this species, eight occurrences of this perennial herb are documented. The Laramie columbine is restricted to the Laramie Range in southeastern Wyoming and more than 50 percent of this local endemic plant species' continental range is encompassed in Wyoming. Habitat for this species includes shady crevices and ledges in granite boulders or cliffs. A moderate number (21 to75) of occurrences are documented for the Laramie columbine, including Converse County. The species is rare (less than 5,000 individuals or less than 400 occupied acres) in abundance. Although trend data are not available, populations are thought to be stable. Due to the remoteness and rugged nature of the Laramie Range, populations of this species are not presently considered threatened; however, populations near trails and campgrounds could be adversely impacted by collecting, grazing, and trampling by hikers and OHV use.

Porter's sagebrush (BLM Sensitive)

Porter's sagebrush is ranked as an imperiled species at the state and global levels based on rarity and vulnerability to extinction. Porter's sagebrush is endemic to the Wind River Basin with known occurrences only in Fremont, Johnson, and Natrona Counties. Habitat for this perennial subshrub is sparsely vegetated badlands from 5,300 to 6,500 feet above MSL. A low number (6 to 20) of occurrences are documented for Porter's sagebrush. This species is uncommon (5,000 to 50,000 individuals or 500 to 5,000 occupied acres) in abundance. Although trend data are not available, trends since 1950 are thought to be stable. Threats to this species include oil and gas exploration and development as all known occurrences are within a known geologic structure identified as high priority for gas exploration and development.

Nelson's milkvetch (BLM Sensitive)

Nelson's milkvetch is ranked as a rare species at the state and global levels based on approximately 18 known occurrences from five counties in Colorado, Utah, and Wyoming (Natrona County). Habitat for this long-lived perennial includes sedimentary formations that concentrate selenium. Threats identified for Nelson's milkvetch include trampling by OHV use and habitat disturbance associated with oil and gas development.

Many-stemmed spider-flower (BLM Sensitive)

Many-stemmed spider-flower is ranked as an imperiled species at the global level based on apparent decline, rarity, occurrence in few protected areas, habitat specificity, annual life cycle, and vulnerability to extinction. This rare wetland annual species occurs as a disjunct population in Wyoming and is documented for Natrona County. Habitat for the many-stemmed spider-flower is limited to alkaline playa

wetlands. A very low number (1 to 5) of occurrences are documented for this species and it is uncommon (5,000 to 50,000 individuals or 500 to 5,000 occupied acres) in abundance. The many-stemmed spider-flower is thought to be in decline. Threats to this species include water development projects; however, the annual life cycle and specific habitat requirements may increase the potential for chance extinction from extended drought or other stochastic events.

William's wafer-parsnip (BLM Sensitive)

William's wafer-parsnip is ranked as a rare species at the global and state levels based on the number of sites, abundance, and known threats. This perennial umbel is endemic to limestone habitats in the Bighorn Mountains. A moderate number (21 to 75) occurrences are documented for William's wafer-parsnip. This species is uncommon (5,000 to 50,000 individuals or 500 to 5,000 occupied acres) in abundance and distribution is limited to four counties in Wyoming, including Natrona. Populations are thought to be stable in part because habitat is often inaccessible and cattle and sheep apparently do not graze this species. However, limestone quarrying and other ground disturbance may pose a threat to this species.

Colorado butterfly plant (Federal Threatened)

Colorado butterfly plan is ranked rare at the global level, imperiled at the state level, and threatened at the federal level based on the small number of sites globally, limited number of protected sites, and inherent population fluctuations. Colorado butterfly plant was listed as threatened in accordance with the ESA on October 18, 2000. Critical habitat for this species is designated in Platte County (USFWS 2005a). Habitat for the Colorado butterfly plant includes subirrigated, alluvial soils in floodplains and drainage bottoms at elevations of 5000-6400 feet. Colorado butterfly plant is an early successional species adapted to periodically disturbed stream channels. In the absence of periodic disturbance from flooding (historically, fire and grazing disturbance may also have been important), establishment of dense vegetation may prevent new seedlings from establishing. A low number (6 to 20) of occurrences are documented for this species and it is uncommon (5,000 to 50,000 individuals or 500 to 5,000 occupied acres) in abundance. Trend data for six populations showed increases for the period 1984 to 1986 whereas seven other populations showed decreases for the same period. Colorado butterfly plant within the protected F.E. Warren Air Force Base near Cheyenne, Wyoming shows a 16-year increasing trend; however, one subpopulation on the Air Force Base, located in a densely vegetated stream section, has declined (Fertig 1998, Heidel 2005). Identified threats to Colorado butterfly plant include herbicide spraying, livestock grazing, haying and mowing, water development, conversion of rangeland to cultivation, competition from exotic plants, and loss of habitat to urban expansion. (Marriott 1987; Fertig 1994). Changes in habitat suitability due to natural succession and the lack of periodic habitat disturbance may threaten this species, even in protected areas (Fertig 2000c; USFWS 2000a).

Blowout penstemon (Federal Endangered)

Blowout penstemon is ranked as critically imperiled at the global and state levels and endangered at the federal level based on its restricted distribution to open, early-successional habitat and regional endemic range in the Nebraska Sandhills Prairie and the Great Divide Basin in Wyoming. Approximately 10 small populations are known within the entire distribution of this species. Critical habitat for blowout penstemon is not designated within the planning area and the species is not known to occur in the planning area.. Blowout penstemon is a perennial herb adapted to blowout dunes habitat that are caused and maintained by wind erosion. A very low number (1 to 5) of occurrences are documented for this species and it is rare (less than 5,000 individuals or less than 400 occupied acres) in abundance. Remaining populations of blowout penstemon are thought not to be stable; however, annual census data for this species in Wyoming is only available since 2000. Fire suppression and dune stabilization are thought to have reduced suitable habitat for this species and isolated remaining populations. Threats to blowout penstemon include habitat loss, stabilization of sand-dune habitat, natural plant succession, and

collection by humans (Fertig 2001a; USFWS 1987). Two management requirements are identified for blowout penstemon: 1) Reducing competition from other vegetation where the species is established; and 2) Creating favorable conditions for colonization of new sites. Fire and livestock grazing may benefit blowout penstemon or create favorable habitat conditions by controlling competing vegetation.

Western prairie fringed orchid (Federal Threatened)

Western prairie fringed orchid is ranked imperiled at the global level and threatened at the federal level based on limited distribution and ongoing threats. Historically wide spread in distribution, the western prairie fringed orchid is known from only 172 occurrences, most of which are consider small populations. The western prairie fringed orchid is not documented in the planning area or in Wyoming; however, it does occur within the Platte River watershed in Nebraska (USFWS 1996). Groundwater-maintained habitats within the Platte River watershed may be affected by activities within the planning area that deplete groundwater contributing to the North Platte River (USBR and USFWS 2003). This perennial orchid is long-lived and found in western portions of tallgrass prairie in North America. Habitat for the western prairie fringed orchid is commonly moist, calcareous subsaline prairie and sedge meadows that may be periodically flooded. Threats to this species include habitat loss or fragmentation, conversion of tallgrass prairie habitat to agricultural uses, and hydrologic alteration which draws down the water table near the plant roots (USBR and USFWS 2003; USFWS 1996). Overgrazing, intensive hay mowing, and fire suppression are also identified as threats and collection by humans and use of herbicides are identified as potential threats.

Laramie false sagebrush (BLM Sensitive)

Laramie false sagebrush is ranked imperiled at the global and state levels based on limited distribution. This southeastern Wyoming endemic species is known to occur in southwestern Converse and southeastern Natrona Counties (Fertig 2000d). More than 50 percent of its continental range occurs in Wyoming. Six of the 11 sites in four counties where this species is documented, were discovered as recently as 1997. Laramie false sagebrush is a perennial herb occurring on rocky limestone soils at elevations of 7,545 to 8,530 feet above MSL. A low number (6 to 20) of occurrences are documented for this species and it is uncommon (5,000 to 50,000 individuals or 500 to 5,000 occupied acres) in abundance. Threats to this species include road development, vehicle traffic, and competition from INPS (Fertig 2000d). In addition, one of the limestone outcrops where this species occurs is being quarried.

Ute ladies'-tresses (Federal Threatened)

The Ute ladies'-tresses is ranked as rare at the global level, critically imperiled at the state level, and threatened at the federal level. This BLM Sensitive species is a local endemic known to occur in Converse and Goshen Counties (Fertig 2001b). More than 50 percent of the continental range of this species occurs in Wyoming. Habitat for this perennial orchid includes riparian and wet meadow habitats. A very low number (1 to 5) of occurrences are documented for this species and it is rare (less than 5,000 individuals or less than 400 occupied acres) in abundance. Based on limited census data and loss or conversion of riparian habitat throughout its range, populations of Ute ladies'-tresses are thought to be declining. Threats to this species include water developments, intense domestic livestock grazing, hay mowing, competition from INPS, habitat fragmentation urbanization, and collection by humans (Fertig 2001b; USFWS 1992). In 2004, USFWS initiated a 5-year status review to determine if delisting this species is warranted (USFWS 2004b).

Management of special status plant species within the planning area presents a number of challenges including declining population trends for select species, drought and other natural events, spread and control of INPS, maintaining PFC for riparian and wetland habitats, impaired floodplain connectivity, water depletions in areas contributory to the Platte River Basin, vegetation treatment with prescribed fire or herbicides, lack of periodic disturbance events (e.g., fire, flood, grazing), physical trampling (e.g.,

OHV use), loss of habitat resulting from altered hydrology, and challenges presented by special status plant populations occurring over multiple land ownerships. While threats to some species may remain low due to the remoteness of habitat, threats to other species may increase despite distance or restricted access. For example, special status plant species dependent on groundwater levels may be affected by upstream depletions of groundwater far removed from impact populations. Moreover, early successional special status plant species protected from habitat alteration, may still be adversely affected by natural succession and the lack of fire, flooding, or other disturbance factors necessary to retain early successional habitat.

The BLM manages the challenges for special status plant species in the planning area according to BLM Manual 6840 – Special Status Species Management (BLM 2001d), including the use of all methods and procedures necessary to improve the status of federally listed species and their habitats to a point where provisions of the ESA are no longer necessary. BLM Manual 6840 includes the objectives (1) conserve listed species and the ecosystems on which they depend and (2) ensure that actions requiring authorization or approval by the BLM are consistent with the conservation needs of special status species and do not contribute to the need to list special status species, either under the provisions of the ESA or BLM Manual 6840. Management actions to address the challenges for federally listed plant species often are derived from the consultation process (i.e., Section 7 of the ESA). Management actions for BLM sensitive species focus on the following goals of the BLM Wyoming Sensitive Species Policy and List (BLM 2002d):

- Maintain vulnerable species and habitat components in functional BLM ecosystems.
- Ensure special status species are considered in land management decisions.
- Prevent a need for species listing under the ESA.
- Prioritize needed conservation work with an emphasis on habitat.

Current management uses appropriate regulatory and policy mechanisms to minimize or avoid impacts to special status plant species. In addition, current management of special status plant species considers opportunities for species recovery. For example, current management within the planning area focuses on managing riparian and wetland habitats toward proper functioning condition, managing livestock grazing to healthy rangeland standards, and surveying for special status plant species in suitable habitat prior to authorizing surface disturbing activities. Management actions incorporated in alternatives (see Chapter 2) address the challenges identified for special status plant species by continuing or improving the focus of current management. In addition, alternatives consider a range of management actions that may affect special status plant species in the planning area including management of specific plant communities (e.g., sagebrush, aspen, mountain shrubland) towards desired plant community; restrictions on placement of livestock supplements relative to special status plant species populations and riparian areas; restrictions on surface disturbance and occupancy on steep slopes and highly erosive soils; restrictions on discharge of water produced from coalbed natural gas wells; restrictions on OHV use; restrictions on energy and mineral development; and special designations.

Table 3-22. Special Status Plant Species Known to or Potentially Occurring in the Casper Planning Area

Common Name	Special Status[1]	Rank[2]	Habitat Association[3]
Laramie columbine	S	G2/S2	Associated with shady granite outcrop microsites (crevices, ledges, cliff bases). Elevation range is from 6,250 to 10,100 feet (Keinath et al. 2003; Fertig 2004).
Porter's sagebrush	S	G2/S2	Associated with ashy or tubaceous mudstones and clay slopes among badlands and sparse vegetation. Elevation range is from 5,300 to 6,500 feet (Fertig 2000a; Keinath et al. 2003).
Nelson's milkvetch	S	G2/S2	Associated with alkaline, seleniferous, clay flats, shale bluffs and gullies, pebbly slopes, and volcanic cinders with sparse vegetation. Elevation range is from 5,200 to 7,600 feet (Heidel 2003).
Many-stemmed spider-flower	S	G2G3/S1	Associated with whitish alkali-rich soils amid hydrogen-sulfide gas. Adjacent shallow, spring-fed playa lakes or dried lakebeds. Highest species occurrence is among damp flats with approximately 90 percent vegetative cover. May also occur (in lower abundance) on clayey dunes with approximately 50 percent vegetative cover. Patchy occurrence is known to take place on dry alkaline depressions with approximately 20 percent vegetative cover. Occurs at elevations greater than 5,860 feet (Fertig 2000a; Keinath et al. 2003).
Williams' wafer-parsnip	S	G2G3/S2S3	Associated with thin, sandy soils on south or east facing slopes among small cracks or pockets in limestone bedrock. Elevation range is from 6,000 to 8,300 feet (Fertig 2000b; Keinath et al. 2003).
Colorado butterfly plant	T	G3T2/S2	Associated with level to slightly sloped landscapes with sub-irrigated soils within a floodplain or drainage bottom. Elevation range is from 5,000 to 6,400 feet (Fertig 2000c; Keinath et al. 2003).
Blowout penstemon	E	G1/S1	Associated with the leeward slope of early successional sands dunes with spare vegetation. Also connected to sandy apron deposits on the lower half of steep granite or sedimentary mountains or ridges. Elevation range is from 6,680 to 7,440 feet (Fertig 2001a; Keinath et al. 2003).
Western prairie fringed orchid	T	G2/ not in WY	Associated with mesic swales or draws in moist, tallgrass, calcareous or subsaline prairies and sedge meadows (USFWS 1996). Occurs on watersheds adjoining the planning area.
Laramie false sagebrush	S	G2/S2	Associated with rocky limestone ridges and gentle slopes among cushion plant communities. Elevation range is from 7,500 to 8,600 feet (Fertig 2000d; Keinath et al. 2003).
Ute ladies'-tresses	T	G2/S1	Associated with low, level, floodplain terraces or abandoned oxbows less than 15 meters from a stream channel. Vegetation coverage is usually between 75 and 90 percent. Soils are basic (pH 7.7 to 7.8), moist, and range from alluvial sand and coarse silt to whitish loamy clays. Elevation range is from 4,650 to 5,420 feet (Fertig 2001b; Keinath et al. 2003).

Source: Heidel 2003

[1]Status: E = Federal Endangered, T= Federal Threatened, S = BLM Sensitive

[2]Rank: G - Global rank: Refers to the rangewide status of a species. Plant species in this section ranked G1, G2, G2G3, or G3T2 are not considered "stable". These species are described in NatureServe as rare and are critically imperiled or imperiled. Only species ranked G4 or G5 are considered stable.

T - Trinomial rank: Refers to the rangewide status of a subspecies or variety.

S - State rank: Refers to the status of the taxon (species or subspecies) in Wyoming. State ranks differ from state to state.

1 - Critically imperiled because of extreme rarity (often known from 5 or fewer extant occurrences or very few remaining individuals) or because some factor of a species' life history makes it vulnerable to extinction.

2 - Imperiled because of rarity (often known from 6-20 occurrences) or because of factors demonstrably making a species vulnerable to extinction.

3 - Rare or local throughout its range or found locally in a restricted range (usually known from 21-100 occurrences).

[3] Species does not occur in the planning area; occurs in habitat subject to hydrologic influence from activities in the planning area. Habitat associations are described for Wyoming and (or) the planning area.

The BLM addresses these management challenges in accordance with BLM Manual 6840 - Special Status Species Management (BLM 2001d) with these objectives (1) conserve listed species and the ecosystems on which they depend and (2) ensure that actions requiring authorization or approval by the BLM are consistent with the conservation needs of special status species and do not contribute to the need to list special status species, either under the provisions of the ESA or BLM Manual 6840.

Management actions to address the challenges for federally listed plant species often are derived from the consultation process (i.e., Section 7 of the ESA). Management actions for BLM sensitive species focus on the following goals of the BLM Wyoming Sensitive Species Policy and List (BLM 2002d):

- Maintain vulnerable species and habitat components in functional BLM ecosystems.
- Ensure special status species are considered in land management decisions.
- Prevent a need for species listing under the ESA.
- Prioritize needed conservation work with an emphasis on habitat.

3.4.8 Special Status Species – Fish

Special Status Species fisheries habitats include perennial and intermittent streams that support fish through at least a portion of the year. Fisheries habitats within the planning area encompass five watersheds: North Platte, Wind, Cheyenne, Niobrara, and Powder River (Map 5). Of these, only the North Platte watershed contributes flows to the Platte River. The North Platte watershed itself includes lands outside of the planning area and is the largest of six major sub-basins of the Platte River recovery implementation area, which also includes the South Platte, Central Platte, Lower Platte, Elkhorn, and Loup River sub-basins (USBR and USFWS 2003).

Fisheries habitats within the planning area are limited due to the arid nature of the landscape, the limited number of perennial and intermittent streams, and a fragmented land ownership pattern. Watersheds vary by vegetation types, water quality and quantity, land use, and location. Refer to the Fish and Wildlife Resources – Fish section for a more detailed description of fisheries habitat in the planning area. Drainages providing fisheries habitats within the planning area also are described under surface water quality in the Water section of this document.

No BLM sensitive fish species are present within the planning area; however, there are 10 NSS recognized by the WGFD as Status 1-3 (NSS1-3) including lake chub, flathead chub, hornyhead chub, black bullhead, common shiner, finescale dace, pearl dace, plains topminnow, plains minnow, and suckermouth minnow (refer to Appendix E). Wyoming NSS1-3 are species that may be rare to common, with declining or vulnerable habitats.

No federally listed fish species occur in the planning area; however, the endangered pallid sturgeon could be affected by upstream activities, including those within the North Platte watershed portion of the planning area. Native habitats for this species include large rivers exhibiting free-flowing, warm, and turbid waters. Historically, the pallid sturgeon's range included the Missouri and Mississippi rivers, as well as lower reaches of the Platte, Kansas, and Yellowstone rivers (USFWS 1993). Disjunct populations now occur in the upper Missouri near the Yellowstone River in Montana, near Gavins Point Dam in South Dakota, and in the Platte River in Nebraska (National Research Council 2005). The USFWS attributes the decline of this species to habitat loss, commercial harvest, hybridization, and pollution (USFWS 1993). For a discussion of water quality and water quantity in the planning area, please refer to the Water section of this document.

Water depletions upstream can change the velocity, volume, and timing of downstream river water flows. Historically, water-development projects (e.g., dams, reservoirs, water and sediment control basins, irrigation diversions, sand and gravel mining, and wetland creation) have altered historic surface water hydrographs (e.g., water-flow timing, volume, and velocity) in the Platte River Basin through consumption, evaporation, or by altering the timing of water flows. The USFWS indicates that habitat degradation and destruction within the Platte River Basin are primarily a result of water resource developments in the Platte River Basin (USFWS 2002b). As a result, the USFWS determined that water depletions to the Platte River Basin might jeopardize the continued existence of this species. Consequently, the BLM conducts formal consultations with the USFWS regarding any actions resulting in water depletion to the Platte River Basin.

While fisheries habitat condition in the planning area is a function of historic activities, it is also actively managed by the BLM to (1) conserve listed species and the ecosystems on which they depend and (2) ensure that the actions requiring authorization or approval by the BLM are consistent with the conservation needs of special status species and do not contribute to the need to list special status species, either under the provisions of the ESA, BLM Manual 6840 (BLM 2001d), or the BLM Wyoming Sensitive Species Policy and List (BLM 2002d). Activities and management challenges affecting Special Status Species – Fish are similar to those discussed in the Fish and Wildlife Resources – Fish Section.

3.4.9 Special Status Species – Wildlife

Special status species are those listed as threatened or endangered, are proposed for listing, or are candidates for listing under the provisions of the ESA; those listed by a state implying potential endangerment or extinction (i.e., NSS); or those designated by the BLM State Director as sensitive. Wyoming NSS1-3 species are discussed in this section and include species that may be rare to common, with declining or vulnerable habitats.

Within the planning area three wildlife species (bald eagle, black-footed ferret, and Preble's meadow jumping mouse) are listed as threatened or endangered under the ESA (see Table 3-23). In addition, four endangered bird species (whooping crane, interior least tern, piping plover, and Eskimo curlew) occur outside of the planning area but depend on the Platte River system for survival. These four are potentially affected by upstream actions, including those occurring within the planning area (see Table 3-23). Critical habitat for the Preble's meadow jumping mouse is designated within the planning area for portions of Cottonwood, Chugwater, and Lodgepole creeks and some tributaries (USFWS 2003c). Known distribution of special status wildlife species within the planning area appears in Maps 26 through 30.

Special status wildlife species in the planning area inhabit a variety of habitat types, including sagebrush shrublands (e.g., sage sparrow, sage thrasher, greater sage-grouse, loggerhead shrike, ferruginous hawk), grasslands (e.g., long-billed curlew, burrowing owl, swift fox), and riparian and wetland habitats (e.g., northern leopard frog, long-eared myotis, yellow-billed cuckoo, white-faced ibis). For most special status species, comprehensive data on population numbers and distribution within the planning area are not available. Occurrence data from WYNDD identify presence and location for some special status wildlife species in the planning area; however, these data reflect historic observations from opportunistic or project specific surveys rather than a complete inventory of the planning area.

Table 3-23 and the subsequent discussion of special status wildlife species in this section are organized by the applicable Wyoming statutory categories identified in the Fish and Wildlife Resources – Wildlife section. Table 3-23 identifies all special status wildlife species that (1) occur in, (2) have potential habitat in, or (3) could be influenced by activities in the planning area. Table 3-23 also summarizes the status and general habitat description for each special status wildlife species.

The BLM uses HMPs to focus habitat management for special status (as well as other) species within the planning area. For example, the Bald Eagle HMP for the Platte River Resource Area and Jackson Canyon ACEC focuses management of bald eagle habitats throughout the planning area. This and other HMPs used by the Casper Field Office are identified in Table 3-20 in the Fish and Wildlife Resources – Wildlife section of this document.

Game Birds (Greater Sage-Grouse)

Populations of greater sage-grouse have declined throughout their native range in western North America. Several petitions to list greater sage-grouse as threatened were submitted to USFWS in 2002. In January 2005, the USFWS determined that listing under the ESA was not warranted. Greater sage-grouse habitat components and terminology referenced in the following discussion are defined in BLM 2005i. Braun (2002) and Connelly et al. 2000 provide additional information regarding greater sage-grouse habitat needs and habitat and population trends.

According to the recently completed range-wide *Conservation Assessment of Greater Sage-Grouse and Sagebrush Habitats* (Connelly et al. 2004), the numbers of greater sage-grouse have declined across their range during the past 50 years, as has the quality and distribution of the birds' requisite sagebrush-steppe habitats. Population declines of greater sage-grouse are largely attributed to the loss and degradation of sagebrush habitats (Martin 1970; Braun et al. 1977; Swenson et al. 1987; Braun 1998). Changes in land use and land development are the primary causes of habitat loss, while habitat degradation is a complicated interaction among many factors, including drought, livestock grazing, changes in natural fire regimes, and the invasion of INPS (Fischer et al. 1996; Pyle and Crawford 1996; Beck and Mitchell 2000; Nelle et al. 2000). Emerging issues include impacts of pesticides, disease, wind turbines, noise, and raptor perch sites on powerlines among sage-grouse populations.

Presently, there are approximately 200 greater sage-grouse leks documented throughout the planning area, primarily in Natrona and Converse counties, with the highest densities of leks occurring in larger tracts of sagebrush shrublands (Map 20). The largest greater sage-grouse lek complexes are found in Bates Hole, the Shirley Basin, the Rattlesnake Hills, the South Bighorns, and the Laramie Range foothills. Occupied habitat is fairly contiguous throughout much of Bates Hole and the Shirley Basin. Habitats within the Rattlesnake Hills and the South Bighorns are more fragmented by changes in habitat type and land use practices. Greater sage-grouse habitats in the Laramie Range are primarily limited to the portion of the west slope of the Laramie Range. Large contiguous blocks of sagebrush and grassland communities east of the Laramie Range have, for the most part, been eliminated. Specific wintering concentration areas of sage-grouse within the planning area are not widely documented to date. Sage-grouse may benefit from HMPs identified in Table 3-20 through the provision of seasonal habitats.

The following discussion of the greater sage-grouse population trend within the planning area is summarized from WGFD 2005e and reproduced in entirety in Appendix E. The WGFD and the BLM have annually surveyed and monitored greater sage-grouse leks since the 1950's. Male attendance on leks is utilized by the WGFD to provide an index of relative change in population abundance in response to environmental conditions over time. The number of males observed per lek has decreased by more than 31 percent since 1958. More recently, the number of males counted per lek increased through the 1980s, peaked in 1992, dramatically declined through the early 1990s, came to an all-time low between 1994 and 1997, and has since recovered to a level similar to the early 1980s. Since data collection was standardized in 1996, the number of males counted on leks has exhibited some recovery.

Table 3-23. Special Status Wildlife Species in the Casper Planning Area

Common Name	Status[1]	Habitat
Game Birds		
Greater sage-grouse	Sensitive, NSS2, Level I Priority	Sagebrush
Migratory Game Birds (Waterfowl)		
Northern pintail	NSS3	Marshes and lakes in association with most habitats below 8,000 feet (WGFD 2004c)
Lesser scaup	NSS3	Marshes, lakes, rivers (WGFD 2004c)
Barrow's goldeneye	NSS3	Aspen; cottonwood-riparian; marshes; lakes and rivers associated with lodgepole pine, Douglas fir, and other or mixed coniferous forests (WGFD 2004c)
Redhead	NSS3	Marshes, lakes, rivers (WGFD 2004c)
Canvasback	NSS3	Marshes, lakes, rivers (WGFD 2004c)
Nongame (Raptors)		
Bald eagle	Threatened, NSS2, Level I Priority	Cottonwood riparian, mixed coniferous forests near large lakes and rivers
Burrowing owl	Sensitive, NSS4, Level I Priority	Grasslands, basin-prairie shrublands
Ferruginous hawk	Sensitive, NSS3, Level I Priority	Basin-prairie shrublands, grasslands
Northern goshawk	Sensitive, NSS4, Level I Priority	Coniferous forests, aspen
Peregrine falcon	Sensitive, NSS3, Level I Priority	Tall cliffs
Merlin	NSS3, Level II Priority	Ponderosa pine savannah, juniper woodlands, basin-prairie shrublands
Nongame (Neotropical Migrants)		
Brewer's sparrow	Sensitive, NSS4, Level I Priority	Basin-prairie shrublands
Loggerhead shrike	Sensitive, Level II Priority	Basin-prairie shrublands, mountain-foothills shrublands
Sage sparrow	Sensitive, NSS4, Level I Priority	Basin-prairie shrublands, mountain-foothills shrublands
Sage thrasher	Sensitive, NSS4, Level II Priority	Basin-prairie shrublands, mountain-foothills shrublands
Baird's sparrow	Sensitive, Level I Priority	Grasslands
Long-billed curlew	Sensitive, NSS3, Level I Priority	Grasslands, plains, foothills, wet meadows
Mountain plover	Sensitive	Shortgrass prairies and shrubsteppe; prefers areas with little vegetative cover, such as prairie dog towns (USFWS 2003a)
White-faced ibis	Sensitive, NSS3	Marshes, wet meadows
Yellow-billed cuckoo	Sensitive, NSS2, Level II Priority	Cottonwood-riparian
Trumpeter swan	Sensitive	Wetlands, lake and pond edges
American white pelican	NSS3, Level II Priority	Rivers, lakes, ponds

Table 3-23. Special Status Wildlife Species in the Casper Planning Area (Continued)

Common Name	Status[1]	Habitat
Black-crowned night heron	NSS3	Marshes, lakes
Snowy egret	NSS3	Marshes, lakes, rivers
Caspian tern	NSS3	Marshes, aquatic areas
Forster's tern	NSS3, Level I Priority	Marshes, aquatic areas
Black tern	NSS3, Level I Priority	Marshes, aquatic areas
Franklin's gull	NSS3, Level I Priority	Marshes, lakes
Lewis's woodpecker	NSS3, Level II Priority	Ponderosa pine savannah, juniper woodlands, cottonwood-riparian, aspen
Willow flycatcher	NSS3, Level II Priority	Riparian shrub
Eskimo curlew[2]	Endangered	Tundra and grasslands; migratory stopover habitat included grasslands adjacent to the Platte River (Gill et al. 1998)
Interior least tern[2]	Endangered	Nests on unvegetated alluvial sand and gravel bars along major rivers, including the Platte River (USFWS 1985).
Piping plover[2]	Endangered	Nests on protected sand and gravel bars along rivers and on unvegetated shores of alkali wetlands (USFWS 2001)
Whooping crane[2]	Endangered	Nests in large undisturbed marshlands; for migration, require sand and gravel bars for night roosting and feed in grain fields during the day (USFWS 1978)
Nongame (Mammals)		
White-tailed prairie dog	Sensitive, NSS4	Basin-prairie shrublands
Black-tailed prairie dog	Sensitive, NSS3	Grasslands
Black-footed ferret	Endangered, NSS1	Prairie dog colonies
Preble's meadow jumping mouse	Threatened	Dense riparian areas in foothills and prairies (USFWS 2003c)
Swift fox	Sensitive, NSS4	Grasslands
Townsend's big-eared bat	Sensitive, NSS2	Caves and abandoned mines, deciduous forests
Spotted bat	Sensitive	Deserts and open woodlands; often forage over water
Long-eared myotis	Sensitive, NSS2	Caves and abandoned mines, coniferous forests
Fringed myotis	Sensitive, NSS2	Caves and abandoned mines, coniferous forests
Western small-footed myotis	NSS3	Caves and abandoned mines, basin-prairie shrublands
Little brown myotis	NSS3	Caves and abandoned mines, most habitats
Long-legged myotis	NSS2	Caves and abandoned mines, coniferous forests
Big brown bat	NSS3	Most habitats
Pallid bat	NSS2	Sagebrush-grasslands, cliffs, rock outcrops
Olive-backed pocket mouse	NSS3	Basin-prairie shrublands
Silky pocket mouse	NSS3	Basin-prairie shrublands
Hispid pocket mouse	NSS3	Sagebrush-grasslands
Plains harvest mouse	NSS3	Grasslands
Prairie vole	NSS3	Basin-prairie shrublands

Table 3-23. Special Status Wildlife Species in the Casper Planning Area (Continued)

Common Name	Status[1]	Habitat
Eastern red bat	NSS4	Coniferous and deciduous forest, riparian woodlands
Hoary bat	NSS4	Coniferous and deciduous forest, riparian woodlands
Silver-haired bat	NSS4	Coniferous and deciduous forest, riparian woodlands
Sagebrush vole	NSS4	Basin-prairie shrublands
Plains pocket gopher	NSS4	Sagebrush-grasslands
Nongame (Amphibians)		
Northern leopard frog	Sensitive	Wetlands, streams, and ponds, usually with aquatic vegetation

Sources: BLM 2002d; USFWS 2003b; WGFD 2004c

[1] Status: Sensitive = BLM Sensitive Species; Threatened, Endangered, Proposed, Candidate = in accordance with the ESA; State-listed definitions:

NSS1 - Native Species Status 1 — Populations are greatly restricted or declining, extirpation appears possible OR on-going significant loss of habitat.

NSS2 - Native Species Status 2 — Populations are declining, extirpation appears possible; habitat is restricted or vulnerable, but no recent or ongoing significant loss; species may be sensitive to human disturbance. *~OR~* Populations are declining or restricted in numbers and (or) distribution, extirpation is not imminent; ongoing significant loss of habitat.

NSS3 - Native Species Status 3 — Populations are greatly restricted or declining, extirpation appears possible; habitat is not restricted, vulnerable, but no loss; species is not sensitive to human disturbance. *~OR~* Populations are declining or restricted in numbers and (or) distribution, extirpation is not imminent; habitat is restricted or vulnerable, but no recent or ongoing significant loss; species may be sensitive to human disturbance. *~OR~* Species is widely distributed; population status or trends are unknown, but are suspected to be stable; ongoing significant loss of habitat.

NSS4 - Native Species Status 4 — Populations are greatly restricted or declining, extirpation appears possible; habitat is stable and not restricted. *~OR~* Populations are declining or restricted in numbers and (or) distribution, extirpation is not imminent; habitat is not restricted, vulnerable, but no loss; species is not sensitive to human disturbance. *~OR~* Species is widely distributed, population status or trends are unknown but are suspected to be stable; habitat is restricted or vulnerable, but no recent or ongoing significant loss; species may be sensitive to human disturbance. *~OR~* Populations are stable or increasing and not restricted in numbers and (or) distribution; ongoing significant loss of habitat.

[2] Species does not occur in the planning area. Species occupies habitat along the Platte River in Nebraska, which is subject to the hydrologic influence of activities affecting North Platte River downstream flows.

In 2000, the Wyoming Sage-Grouse Working Group was formed to develop a statewide, multi-agency strategy for the conservation of sage-grouse. This group prepared the Wyoming Greater Sage-Grouse Conservation Plan (2003) to provide for coordinated management and direction across the state. In 2004, local sage-grouse working groups were formed to develop and implement local conservation plans. The majority of the planning area is split between the Bates Hole/Shirley Basin and Powder River Basin local working groups, in which the BLM participates. Current management of greater sage-grouse focuses primarily on the enhancement and protection of sage-grouse seasonal habitats. A description of seasonal and spatial stipulations for greater sage-grouse are identified as management actions for existing management and alternatives in Chapter 2.

Current management restricts surface disturbance and occupancy within ¼ mile of occupied greater sage-grouse leks. In addition, human activity between 8 p.m. and 8 a.m. March 1 to May 15 also is avoided within the same ¼ mile buffer. Current management also restricts surface-disturbing and disruptive activities in suitable greater sage-grouse nesting and early brood-rearing habitats within 2 miles of an occupied lek or in identified greater sage-grouse nesting and early brood-rearing habitats outside the 2-mile buffer from March 15 to July 15.

Migratory Game Birds (Waterfowl)

Special status species migratory game birds (waterfowl) include canvasback, northern pintail, lesser scaup, redhead, and Barrow's goldeneye (see Table 3-23). Population trends for these species generally are declining range-wide. In the planning area, the primary habitat for these species is open water located along the North Platte River. Habitat, management challenges, and actions for special status waterfowl species are similar to those described for waterfowl (see Wildlife section). See also Ducks Unlimited's Conservation Plan (Ducks Unlimited 2004) for additional information.

Nongame (Raptors)

Six special status raptor species are known to occur within the planning area (see Table 3-23). All except the merlin are BLM sensitive species. One, the bald eagle, is a federally threatened species. The remaining five are classified as WGFD NSS3 or 4 (see the Glossary for definition of NSS categories). All six raptor species are Wyoming Partners in Flight Priority Species (either Level I or II). Two species, the ferruginous hawk and burrowing owl, depend on grassland and sagebrush-grassland habitats, while the northern goshawk requires coniferous forests and aspen stands. The USFWS Utah Field Office Guidelines for Raptor Protection From Human and Land Use Disturbances (USFWS 2002a) summarizes the typical nesting periods for these and other raptor species. There are 46 artificial nesting structures constructed in the planning area. Of these, 14 structures constructed as mitigation outlined in the Cave Gulch-Bullfrog-Waltman Natural Gas Development Project (BLM 1997b) protected by a ¼ mile no surface occupany (NSO) stipulation and an additional ¼ mile seasonal restriction (timing limitation stipulation) for activities occurring February 1-July 31. Current management does establish a buffer zone (controlled surface use) around raptor nest sites that considers topography and special status prey habitats surrounding the nest site. Except for bald eagles, raptor buffer zones around nests are ¼ to ½ mile in size for the period February 1 through July 31.

Management challenges for special status raptor species include habitat degradation, fragmentation, loss; lack of cottonwood and aspen regeneration; collision and electrocution from powerlines; collision with wind turbines; and incompatible land use practices (e.g., land conversion, clear-cutting, snag removal, industrial activities, intensive recreational activities, removal of burrowing mammals). Other challenges include impacts from contaminants and human disturbance during sensitive periods.

Management actions focus on maintaining the presence of special status raptor species and the habitats upon which they depend in the planning area. Seasonal and spatial protective stipulations are currently applied around identified nest sites and communal roost areas to afford raptors a level of protection from human disturbance and industrial activities.

Bald Eagle

The bald eagle is a large, primarily fish-eating raptor, although they also consume waterfowl and carrion. Bald eagles nest near large bodies of water, such as lakes, reservoirs, and large rivers. Nest sites are typically in large trees adjacent to water. Five bald eagle nests have been identified within the planning area. There are 11 known bald eagle roost sites within the planning area; however, not all of these roosts occur on public lands. Of the 45,772 acres of bald eagle roost areas in the planning area, approximately 14,055 acres (31 percent) occur on BLM-administered land surface. Approximately 37,290 additional acres of bald eagle roost areas occur on BLM mineral estate. An important winter roost for bald eagles is found in the Jackson Canyon ACEC, as well as smaller sites scattered throughout Natrona and Converse counties. Bald eagle habitats are described in detail in the Bald Eagle HMP for the Platte River Resource Area and the Jackson Canyon ACEC (BLM 1992a). Current management of bald eagle habitat includes the following:

Roosts

- All BLM-administered public lands within or adjacent to bald eagle roost are designated full fire suppression zones. However, to the extent possible, trees are not to be cut within 200 yards of the roost during fire suppression. A wildlife biologist shall be present when wildfires threaten an eagle roost.
- Prescribed burning is implemented to meet resource management objectives, but is not permitted from November 1 through March 31.
- NSO or development is allowed.
- Public surface and federal mineral estate is to be withdrawn from location and appropriation under mining laws.
- Mineral materials are not available for disposal.

Nests

- Surface development is prohibited on an area from ¼ to 1 mile of known or discovered nests.

Feeding Areas

- Except for recreation or habitat improvement projects, surface development is prohibited within ¼ mile of the North Platte River on a year-round basis.
- Surface-disturbing activities within ½ mile of the river are not allowed from November 1 through March 31.

Flyways

- Proposed development is analyzed on a case-by-case basis in consultation with the USFWS.
- New power distribution and transmission lines in the Emigrant Gap flyway are designed to reduce hazards to raptors from collisions.

Ferruginous Hawk

This species occurs in grasslands and shrublands during the spring, summer, and fall seasons throughout the planning area. Ferruginous hawks often nest on the ground, topographic high points, or cliffs. There are numerous ferruginous hawk nest sites in the planning area. This species is sensitive to disturbance during the nesting period.

Merlin

Merlins (also referred to as pigeon hawks) are a mid-sized falcon occurring in grasslands, shrublands, and woodland habitats as a seasonal migrant. Merlins use abandoned black-billed magpie nests in juniper, shrubland, and open ponderosa pine habitats within the planning area. Merlins nesting in the planning area have been recorded.

Peregrine Falcon

The peregrine falcon is a mid- to large-sized falcon associated with a variety of habitats during the spring, summer, and fall seasons. Nesting habitats for this species include cliffs, canyons, or other secure topographic features typically near larger water bodies. Nesting sites often are found near an abundant prey base; one peregrine falcon eyrie is known to occur within the planning area. This species was recently delisted from the federal endangered species list.

Northern Goshawk

The northern goshawk is a large accipiter associated with coniferous forests and aspen stands. This species is a seasonal migrant in the planning area. Nesting habitats are generally in coniferous forests. Northern goshawks often forage throughout the forest, including in aspen stands, meadows, and forest openings. Several northern goshawk nest sites have been documented in the planning area.

Burrowing Owl

The burrowing owl is a mid-sized owl closely associated with prairie dog colonies within the planning area. This species nests in prairie dog burrows and is a seasonal migrant in the planning area. Several burrowing owl nests have been documented in the planning area. This species is relatively tolerant of human activity, often to its detriment.

Nongame (Neotropical Migrants)

For the purposes of this RMP, neotropical migrants include birds that breed in the United States and Canada and winter in Latin America (Nicholoff 2003). The terms neotropical migrants and nongame birds are synonymous for this discussion. Twenty-three special status nongame birds are known or suspected to occur within the planning area (Table 3-23). Those species that are widely distributed in Wyoming are believed to have relatively stable population trends within the planning area; however, for species exhibiting a more restricted distribution, population trend data are lacking. Results and analysis of 1966 to 2004 data for the North American Breeding Bird Survey provide more information on trends (Sauer et al. 2005). Collectively, these species occupy all vegetative types within the planning area and are all seasonal migrants.

Management challenges for neotropical migrants include habitat fragmentation and degradation, land conversion, incompatible land uses (e.g., industrial activities, human disturbance, contaminants, agricultural practices), water quantity and quality, lack of cottonwood regeneration, snag removal in preferred habitats, collision with wind turbines and powerlines, and interspecific competition for nest sites.

Management actions maintain the presence of neotropical migrants and their preferred nesting and foraging habitats. Management actions focus on maintaining or increasing the viability and biological integrity of special status species habitats within the planning area.

Mountain Plover

The mountain plover inhabits shortgrass prairies and shrubsteppe habitats, both for breeding and wintering. This species prefers areas with little vegetative cover for nesting, particularly prairie dog towns. In 2003, the USFWS withdrew its proposal to list the mountain plover as threatened. Updated information indicated that threats to this species were not significant and that the population was stable (USFWS 2003a). The species is now included on the BLM sensitive species list. Mountain plovers are considered an uncommon nester in the planning area.

Platte River Bird Species

Four additional endangered bird species occurring outside of the planning area depend on the Platte River system for survival and are potentially affected by federal actions occurring within the planning area. Piping plover, Eskimo curlew, interior least tern, and whooping crane are referred to as Platte River bird species because they occur along the Platte River in central Nebraska, downstream from the planning area. Since 1978, the USFWS has taken the position that all actions resulting in water depletions to the Platte River system may jeopardize the continued existence of one or more federally listed species and adversely modify designated critical habitats (USFWS 2002b). The primary management challenge to

Platte River bird species is water depletion to the Platte River, which could occur from BLM actions in the North Platte watershed portion of the planning area. See Table 3-23 and associated references for more information on the habitat associations of the four Platte River bird species. The Platte River Recovery Implementation Program Draft EIS prepared by the USBR and the USFWS (USBR and USFWS 2003) provides details about the challenges affecting these species.

Yellow-billed Cuckoo

Populations of this species on the west side of the Continental Divide are currently considered for ESA listing. East-side populations appear relatively stable. Preferred habitats for this species include mature cottonwood-riparian gallery forests with a shrubby understory, which is limited in distribution in Wyoming. Known occupied habitats for this species occurs along Sybille Creek and the east slope of the Laramie Range.

Long-billed Curlew

The long-billed curlew is an upland shorebird occupying grasslands and wet meadows in the planning area. Typical nest sites are on the ground near water with a supply of insects and aquatic macroinvertebrates. This species can be found throughout the planning area.

Colonial Waterbirds

Eight waterbird species (American white pelican, white-faced ibis, black-crowned night heron, snowy egret, Caspian tern, Forster's tern, black tern, and Franklin's gull) nest and (or) forage together in wetlands and marsh habitats during the breeding season.

Lewis's Woodpecker

This uncommon summer resident occurs in open ponderosa pine, cottonwood-riparian, aspen, and juniper habitats. This species nests in cavities in either dead or live trees and occasionally poles and feeds primarily on insects, nuts, and berries. Lewis's woodpecker breeding populations have been confirmed in the planning area.

Willow Flycatcher

The willow flycatcher is an insectivore and riparian obligate species and needs a viable riparian shrub habitat to forage and nest successfully. The willow flycatcher is a summer resident and breeder in the planning area.

Sagebrush Obligates

The greater sage-grouse, sage thrasher, Brewer's sparrow, and sage sparrow are sagebrush obligate birds that require intact sagebrush habitats for nearly all their nesting and foraging needs. These species are all known to nest in the planning area.

Loggerhead Shrike

Shrublands are the preferred habitats for the loggerhead shrike and are found throughout the planning area. This species typically nests in deciduous trees or tall shrubs and feeds on insects, small vertebrates, and carrion.

Baird's Sparrow

This uncommon summer resident occupies grasslands and nests in depressions; however, no documented nests have been recorded within the planning area. The Baird's sparrow forages on insects and seeds.

Trumpeter Swan

This species is an occasional migrant that nests on muskrat houses or small islands in open water; however, no breeding populations occur in the planning area. The trumpeter swan feeds mainly on aquatic vegetation and macroinvertebrates.

Nongame (Mammals)

Twenty-four special status nongame mammals are known or suspected to occur within the planning area (see Table 3-23). One is endangered (black-footed ferret), 1 is threatened (Preble's meadow jumping mouse), 7 are designated by BLM as Sensitive, and the remaining 15 have a WGFD NSS1-3 designation. Many of the remaining species are dependent on a grassland component in the habitat. Following is a brief description of existing conditions for nongame mammals identified in Table 3-23.

Black-footed Ferret

The black-footed ferret is a federally endangered species. Historically, the distribution of black-footed ferrets closely matched that of prairie dogs, their primary prey. However, black-footed ferrets were practically extinct by the 1970s due to habitat loss, prairie dog eradication, disease, and shooting. In 1986 and 1987, several ferrets were captured from a site in Meeteetse, Wyoming, to begin a captive breeding program with the goal to reintroduce ferrets into their historic range. There have been five historic black-footed ferret sightings in the planning area: three from Natrona County in the mid-1970s, one from Converse County in 1917, and one from Platte County in 1964 (Meaney and Company 2004).

Black-footed ferrets are located in the Shirley Basin-Medicine Bow Black-Footed Ferret Management Area. BLM currently manages 145,641 acres of public lands in Natrona County within the black-footed ferret ESA Section 10J Rule area in accordance with the black-footed ferret experimental release efforts in Shirley Basin. Although black-footed ferrets from the experimental release area currently are not documented in the planning area, it is possible that ferrets have dispersed into the area; the possibility exists that this species could occasionally occur in or expand into the planning area. Other black-tailed prairie dog complexes, potentially suitable for black-footed ferret reintroduction, occur at other locations within the planning area (WGFD 2005f).

Preble's Meadow Jumping Mouse

Preble's meadow jumping mouse is a federally threatened species; however, the USFWS recently proposed to delist this species. This species is a small rodent that is limited in its distribution in southeast Wyoming. Critical habitat for the Preble's meadow jumping mouse is designated in four places along riparian areas in Converse and Platte counties within the planning area. This habitat includes varying widths (360 to 394 feet) from stream edge for portions of Cottonwood, Chugwater, Lodgepole creeks and some tributaries (USFWS 2003c). The Preble's meadow jumping mouse is associated with brushy riparian systems along foothills and prairies. This species appears to prefer streamside habitats with structural diversity, including a dense herbaceous understory, shrubs, and trees (USFWS 2003c). The primary threats to the species are habitat loss and degradation. Potential habitats for Preble's meadow jumping mouse occurs in Converse, Goshen, and Platte counties.

White-Tailed Prairie Dog

The species occurs in southern and western Natrona County, including 3,365 acres of BLM-administered land. Some colonies within the southern portion of Natrona County are within the Shirley Basin-Medicine Bow black-footed ferret experimental release area. White-tailed prairie dogs have not drawn as much management attention in the past for animal damage-control efforts as have black-tailed prairie dogs. The habitats and behaviors of the two species differ.

Black-Tailed Prairie Dog

Many special status wildlife species are found in prairie dog towns, including the black-footed ferret, burrowing owl, mountain plover, and swift fox. Black-tailed prairie dogs historically inhabited shortgrass and mixed-grass prairies throughout the United States. However, the USFWS estimated that occupied prairie dog habitats have declined by about 99 percent (USFWS 2000b). Habitat loss and fragmentation, disease, and eradication programs remain serious threats to the species. In the planning area, black-tailed prairie dog habitats generally occur in Natrona, Converse, Platte, and Goshen counties; however, most suitable habitat, especially arable lands and drainage bottoms, are located on private and state land. Eight black-tailed prairie dog complexes (44,692 acres within the planning area) either completely or partially exist within the boundaries of the planning area. For land within the planning area administered by the BLM, three of these complexes are greater than 5,000 acres in size and the others are between 800 and 5,000 acres. These complexes may represent important habitats for future black-footed ferret populations.

Current management allows prairie dog control when the following criteria are met:

- Written request is received from the owner of adjacent property or the grazing lessee
- No historical black-footed ferret occurrences or confirmed signs have been recorded in the preceding 5 years
- The prairie dog town is not determined by the USFWS to be essential habitat for the survival of the black-footed ferret
- Prairie dog towns are ½ mile or closer to public lands
- Control of private and public lands must be done concurrently.

Swift Fox

This species occurs in short- and mid-grass prairies, agricultural areas, and irrigated and native meadows within the planning area. Although not an obligate, the swift fox often is found in association with prairie dog towns. The swift fox uses underground dens year-round. The species feeds on small birds, rabbits, and mice in the winter and, typically, ground squirrels in the spring. In addition to small mammals, the swift fox supplements its diet with insects during summer and fall. This species was petitioned for listing under ESA, but its protection under that statute was found not warranted. The swift fox population in Wyoming currently appears to be relatively stable.

Bats

Twelve special status bat species occur within the planning area (see Table 3-23). Although these species utilize a wide variety of habitats, caves and abandoned mines are important habitat components upon which these species depend for roosts, nurseries, and hibernacula.

Management challenges for special status mammals include habitat fragmentation and degradation, land conversion, incompatible land uses (e.g., industrial activities, human disturbance, use of contaminants, AML and cave closures, animal damage-control practices, etc.), lack of cottonwood and willow regeneration, collision with wind turbines (bats), and snag removal in preferred habitats. Management actions are intended to maintain and enhance the presence of nongame mammals and their habitats, upon which they depend.

Nongame (Amphibians)

Special status amphibians in the planning area are limited to the northern leopard frog, a BLM sensitive species. This species occupies riparian and wetland habitats and is typically found in cattail marshes and beaver ponds in the plains, foothills, and montane zones up to 9,000 feet above mean sea level in the

planning area. Adults feed on tadpoles, insects, and other invertebrates. No special status reptile species are known to occur in the planning area.

Management challenges for the northern leopard frog include habitat degradation, land conversion, incompatible land uses (e.g., contaminants, conversion or degradation of aquatic habitats) and degradation of water quantity and quality. Management actions are intended to maintain and enhance the presence of the northern leopard frog and the wetland and riparian habitats upon which it depends.

3.5 Heritage and Visual Resources

The Heritage Resources topic includes the individual resources of cultural, paleontological, and visual resources. Each individual resource section includes a definition and description of the resource, the current condition of the resource, management challenges, and management actions.

3.5.1 Cultural Resources

Cultural resources are any prehistoric or historic district, site, building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. Cultural resources include archeological resources, historic architectural and engineering resources, and traditional resources. Archeological resources are areas where prehistoric or historic activity measurably altered the earth or where deposits of physical remains (e.g., arrowheads, pottery) are discovered. Architectural and engineering resources include standing buildings, districts, bridges, dams, and other structures of historic or aesthetic significance. Traditional resources can include archeological resources, structures, topographic features, habitats, plants, wildlife, and minerals that Native Americans or other groups consider essential for the preservation of traditional culture.

Identified Cultural Resources

Little archeological work was carried out prior to passage of the National Historic Preservation Act (NHPA) in 1966. Cultural resources investigations in the planning area began in earnest in 1967. Most investigations are conducted pursuant to compliance with Section 106 of the NHPA and provisions of the National Environmental Policy Act (NEPA), both of which require federal agencies to consider potential impacts of federally assisted or permitted projects on significant cultural resources. BLM also conducts cultural resources investigations in the planning area pursuant to the establishment of the BLM's stewardship responsibilities under Section 110 of the NHPA, which requires federal land-managing agencies to identify and manage significant cultural resources on lands administered by those agencies.

From 1967 to 2003, approximately 4,029 cultural resource investigations or other projects were conducted within the planning area (BLM 2004g). Surveys to date have occurred on approximately 192,000 acres, about 5 percent of the planning area. In addition to 3,841 Class I, Class II, and Class III (see the Glossary for distinction of these classes) inventories, 85 monitoring projects, 59 testing and evaluation projects, and 17 major excavations or other mitigation projects have occurred. Most recently, the BLM completed a Class I regional overview of the planning area that reviewed and summarized past cultural resources investigations, the numbers and kinds of recorded resources, and cultural resources management directions (BLM 2004g).

The planning area is divided into 16 subregions based on convenient geographic locales: Bates Hole, Cedar Ridge-Badwater Creek, Chugwater, Chugwater Flats, Crescent Basin, East Wind-West Powder River, Goshen Hole, Hartville Uplift/Spanish Diggings, Laramie Range, Pine Ridge, Powder River Basin, Rattlesnake Hills, Saltbush Badlands, South Bighorns, Sweetwater Rocks, and Wheatland Heights. Cultural resource inventory coverage throughout the subregions is not evenly distributed and concentrates more on project locations, particularly, but not limited to, projects related to energy development. A purely scientific archeological approach entails formal sampling techniques, or focuses on areas of particular interest. Although a complete picture of site density and distribution is problematic given the inconsistent nature of inventory coverage, current inventory shows a higher percentage of historic materials on the east side of the planning area and a higher percentage of Native American materials on the west, suggesting the influence of environmental factors or differing homestead success rates.

Investigations to date have recorded 7,844 cultural resource sites within the planning area (BLM 2004g), including archeological resources, historic architectural and engineering resources, and traditional cultural

resources. Approximately 4 percent of the total number of cultural resources possesses both a prehistoric and historic component of some type. A multicomponent cultural resource can be counted as two or more separate cultural resources, even though they occupy the same location.

Native American site types found within the planning area generally are prehistoric and include open and sheltered camps, hearths, lithic scatters, toolstone quarry, lithic workshops, ritual localities, bison kill and butchering, processing areas, stone circles, and rock cairns. Archeological resources relate to the full scope of human presence in the planning area, from the PaleoIndian Period to the Historic Periods. Most archeological resources to date have been identified as being from the Late Archaic and Late Prehistoric periods (roughly the last 5,000 years) (BLM 2004g). One Native American traditional cultural property (TCP) is located in the planning area. TCPs are traditional resources that are eligible for the National Register of Historic Places (NRHP).

Historic era resources include trails, wagon roads, stage roads, transmission lines, irrigation canals, urban buildings, homesteads and ranches, stock-herding camps, cairns, oilfields, bridges, mines, Civilian Conservation Corps camps, and World War II bombing ranges (BLM 2004g). The Special Designations section of this document discusses National Historic Trails and Other Historic Trails.

Sites of Specific Concern to Native Americans

Native American traditional resources include TCPs, and sites of cultural concern that may not be eligible for the NRHP, but are identified as significant by Native American groups and may be protected under the American Indian Religious Freedom Act (AIRFA). In general, Native American traditional resources can include archeological sites; stone alignments; petroglyphs and pictographs; plant, wildlife, and lithic resource collection areas; spiritual sites; and locations that may have spiritual or cultural meanings to Native Americans. The BLM consults with Native American tribes to identify sites of cultural concern found on BLM-administered land, as well as communicates with Native American tribes associated with the planning area. To protect traditional resources, the locations of such are confidential and not released to the public.

One Native American TCP has been documented in the planning area (BLM 2004g). The Cedar Ridge complex is culturally important to the Eastern Shoshone Tribe and possibly to other tribes. It was established as a TCP in 1997 after extensive consultation with the Eastern Shoshone and the Wyoming State Historic Preservation Office (SHPO). This locality was used for more than 5,500 years as a ceremonial site for prayers and rituals and continues to be a sacred place for the Eastern Shoshone to conduct religious observances. The site is considered integral to the proper functioning of contemporary Shoshone ways of life. Executive Order 13007, AIRFA, and elements of the NHPA enjoin the federal agencies to work to prevent disturbance and provide access to such sites. No other TCPs have been identified in the planning area to date (BLM 2004g), although others are likely to be discovered in the future as the tribal consultation process continues.

Current Resource Management

The BLM is responsible for identifying, protecting, managing, and enhancing cultural resources located on its lands or on non-federal lands that may be affected by BLM undertakings. Certain specific cultural resources are managed under Land Use Decisions C-1 and C-5 (BLM 1985a). Land use decisions relating to NHTS (C-2, C-3, and M-1) are discussed in the Special Designations section under National Historic Trails and Other Historic Trails.

BLM Manual 8110, *Identifying Cultural Resources* (BLM 1998c), identifies six use categories for cultural resources: scientific use, conservation for future use, traditional use, public use, experimental use, and discharged from management. A cultural property may be allocated to more than one use

category and allocations are revised when circumstances change or new data become available (BLM 1998c).

The primary management tool used to mitigate potentially adverse impacts to cultural resource values is Section 106, of the NHPA. In addition, Wyoming state protocol, NRHP guidance, and agency manuals aid in complying with Section 106, while providing opportunities for the development of resources. Given these tools, and aside from specific RMP stipulations, the general approach to mitigate impacts includes (1) avoidance by project redesign, (2) minimizing impacts by redesigning projects into noncontributing portions of sites, and (3) full impact mitigation, generally in the form of data recovery excavation.

Management challenges for cultural resources in the planning area include accounting for the impacts of BLM management actions and other activities on heritage resources; identifying and protecting TCPs such as Cedar Ridge; and being able to conduct cultural resource inventories above and beyond those required under Section 106.

Management actions for cultural resources generally address cultural resource inventory, protection of known and unrecorded sites, and public outreach programs. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.5.2 Paleontological Resources

Paleontological resources, usually thought of as fossils, include the bones, teeth, body remains, traces, or imprints of plants and animals preserved in the earth through geologic time. Paleontological resources also include related geological information, such as rock types and ages. All fossils offer scientific information, but not all fossils offer noteworthy scientific information. Fossils generally are considered to be scientifically noteworthy if they are unique, unusual, rare, diagnostically or stratigraphically important, or add to the existing body of knowledge in a specific area of science. Most fossils occur in sedimentary rock formations. Although experienced paleontologists generally can predict which formations may contain fossils and what types of fossils may be found based on the age of the formation and its depositional environment, predicting the exact location where fossils may be found is not possible.

The BLM is legally mandated to manage and protect scientifically noteworthy fossils for the benefit of the public, primarily under the auspices of the Federal Land Policy and Management Act of 1976 (FLPMA). Noteworthy fossils include all vertebrate fossil remains (body and trace fossils) and those plant and invertebrate fossils determined, on a case-by-case basis, to be scientifically unique.

Management of fossils found on BLM-administered lands is restricted to public surface. Collecting fossils is allowed with some restrictions, depending on the significance of the fossils. Hobby collecting of common invertebrate or plant fossils by the public is allowed in reasonable quantities when only hand tools are used. Commercial collecting of fossils is not permitted. Collection of all vertebrate and any administratively designated plant or invertebrate fossils may be done only under permits issued by the BLM to qualified researchers. The basic permit is the survey and limited surface collection permit, issued for reconnaissance work and collection of surface finds, with a 1 square meter limit to surface disturbance. If the disturbance will exceed 1 square meter, or will require mechanized equipment, the researcher must apply for an excavation permit. Prior to authorization of an excavation permit, and in some cases for survey permits in SMAs, the BLM must prepare an EA for the proposed location. All fossils collected under a permit remain public property and must be curated in an approved repository.

Presently, 17 active paleontology permits (16 survey permits, 1 excavation permit), representing 15 different researchers, have been granted for the planning area. Ten of these active permits were issued for

statewide research and may not reflect work presently occurring in the planning area. Five paleontological permittees principally work in the planning area.

No formal monitoring of paleontological resource use or assessing of mitigation efforts is being conducted. The relatively low level of fossil collection for both hobby and scientific use and ongoing mitigation efforts will most likely result in minimal adverse impacts to paleontological resources.

Probable Fossil Yield Classification

Geologic units in the planning area have been classified using the Probable Fossil Yield Classification, according to the probability of yielding paleontological resources of concern, primarily vertebrate fossils, to land managers. The classification uses a ranking of 1 through 5, with Class 5 assigned to geologic formations or members with a high potential for noteworthy fossils. Within the planning area, Class 4 and 5 geologic formations account for approximately 50 percent of the total acreage, encompassing all ownerships. Class 4 and 5 formations underlie about 35 percent of public surface in the planning area. The classifications are defined in the Glossary under Probable Fossil Yield Classification.

Identified Paleontological Resources

Within the planning area, rocks as old as 3 billion years are exposed, but presently known vertebrate or other noteworthy fossil deposits date back to about 200 million years. Potentially, older vertebrate fossils could be found, as older rock formations present in the planning area have produced such finds elsewhere in the state. Nearly all the major fossil-bearing formations identified within Wyoming have been found in the planning area, but they are not as extensively distributed as in other areas. The major formations known to produce dinosaur or marine reptile remains in the planning area include the Chugwater (including the Alcova Limestone), Sundance, Morrison, Cloverly, and Lance formations. The Wind River and White River formations are the main units that produce mammal fossils and other small nonmammalian vertebrates. The Fort Union and Wasatch formations also are known to produce important fossil mammals and other vertebrates, but are not as fossiliferous in this area as the other listed formations.

Chugwater Formation. In general, the Chugwater Formation is made up of reddish mudstones, shales, and thin beds of limestones. The Alcova Limestone Member of the Chugwater Formation consists of a thin, hard, fine-bedded, pinkish-to-light-gray limestone. It rarely exceeds 1.5 to 3 meters in thickness, and is generally about 1-meter thick. Studies of fossils from the Alcova limestone (e.g., *Corosaurus*), suggest deposition during the Late Triassic Period.

Sundance Formation. The Sundance Formation consists of marine sandstones and shales deposited in an inland sea or adjacent near-shore and beach deposits from the latter part of the Jurassic Period. The formation varies in thickness from 75 to 130 meters. The Redwater Shale Member (Jurassic Period) consists of greenish-gray glauconitic mudstones and shales with some interbedded sandstones and limestones containing many invertebrate fossils, including clams, crinoids (sea lilies), and belemnites (squid-like animals). Pterosaur tracks occur in the Upper Jurassic-aged Sundance Formation at Alcova Reservoir. Dinosaur tracks are preserved in the Bighorn Basin at the BLM's Red Gulch Dinosaur Tracksite; dinosaur bones rarely are found. Ichthyosaur, mosasaur, and plesiosaur specimens occur in this formation.

Morrison Formation. The Late Jurassic Morrison Formation deposited in floodplain and lacustrine conditions can be up to 65 meters thick. It consists of green and greenish-gray shale and claystone with lenticular silty sandstones and occasional conglomerates, thin carbonaceous beds, freshwater marls, and limestone lenses characteristic of floodplain and lake deposits. The Morrison Formation is well known for producing scientifically noteworthy and highly diverse fauna and flora. In Wyoming, these include

allosaurs, diplodocids, stegosaurs, and ankylosaurs, as well as reptiles, early mammals, mollusks, fish, and trace fossils. This formation is found throughout the Rocky Mountain area and is noted for fossil deposits at Dinosaur National Monument, Como Bluff, and other world-class sites.

Cloverly Formation. Overlying the Morrison Formation is the Lower Cretaceous Cloverly Formation with an average thickness of approximately 90 meters. The formation primarily has variegated claystones with channel-filling sandstones and conglomeratic sandstones. Above the zone of conglomerates and conglomeratic sandstones at the base of the Lower Cretaceous, the shales and sandstones are buff and gray with purple, maroon, and red shales in the middle. The Cloverly Formation has produced a diverse dinosaur fauna, as well as other Mesozoic reptiles and early mammals. In Wyoming, these include iguanodonts, sauropods, theropods, and ankylosaurs.

Lance Formation. The Late Cretaceous Lance Formation is dominated by nonmarine coastal floodplain sandstones, mudstones, and marls, with marginal marine sandstones and shales in its lower parts. It reaches more than 750 meters in thickness and is found in many places throughout Wyoming. The formation produces a diverse fauna in Natrona County. Lance Formation fossils include tyrannosaurs, ankylosaurs, hadrosaurs, ceratopsians, and pachycephalosaurs as well as mammals, reptiles, birds, and fish.

Wind River Formation. The Wind River Formation is composed of sandstone, conglomerate, mudstone, carbonaceous shale, and minor coal seams. Early Eocene mammal, reptile, and fish fossils have been identified in the Wind River Formation. The Lysitean and Lostcabinian subages of the Wasatchian North American Land Mammal Age are based on fossils recovered partly within the planning area near the communities of Lysite and Lost Cabin. These age designations are used throughout North America to categorize mammal fossils from these time periods.

White River Formation. The White River Formation is composed of bentonitic mudstone, sandstone, and altered and unaltered volcanic debris. About 230 meters of sediments of the early Oligocene White River Formation are exposed in Natrona and Converse counties (Emry 1973). Thousands of fossil vertebrates have been collected from these outcrops, including mammals, reptiles, fish, and birds. This formation is found throughout the Northern Great Plains and forms the landscape preserved at Badlands National Park in South Dakota.

Special Management for Paleontological Resources

The existing plan rescinded the original Pterodactyl Track ACEC designation; however, a mineral withdrawal from the 1872 Mining Law was mandated for this area, but never completed. The existing plan also stipulated no surface development in the Pterodactyl Track area unless it is related to paleontological site interpretation. This area is discussed in greater detail under the Special Designations, Alcova Fossil ACEC section of this document.

Preservation concerns are addressed by mitigation efforts aimed at reducing or preventing loss of paleontological resources and related information. These losses to the public can be caused by surface-disturbing activities, accelerated erosion resulting from natural or manmade actions, transfer from public ownership to private entities during land-tenure adjustments, illegal collecting, or vandalism. Identification of paleontological resources, implementation of proper mitigation measures, and overall sensitivity to the fragility and rarity of the resource is needed to maximize preservation efforts.

Recreation opportunities, which include hobby collecting of fossils and onsite interpretation and development, possibly can be developed within the planning area. Identifying specific hobby collecting areas presently is not possible due to a lack of information, but further study may determine that such areas exist and that collecting activities can occur in those areas without long-term adverse impacts to the

resource. Onsite interpretation and development of localities that prove interesting to the public also is possible, but not without some risk. Concentrating people at a developed site often increases the adverse impacts to that site and the resource due to increased vehicle and foot traffic and vandalism.

The biggest management challenge facing paleontological resources is the protection of important fossils and fossil localities from loss, damage, or destruction resulting from authorized or permissible activities, illegal collecting, vandalism, or disposal through land-tenure adjustments. Another management challenge is providing recreational opportunities to the public by identifying appropriate hobby-collecting areas or interpretive efforts without reducing the significance or interest of the resource.

Management actions for paleontology generally address protection of paleontological resources while providing for hobby and scientific collection, development of interpretive facilities, and identification of areas with high paleontological values. Keeping abreast of research, performing survey and monitoring mitigation of construction activities, avoiding important finds, and developing cooperative agreements with outside institutions can accomplish this. Some of these management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.5.3 Visual Resources

The purpose of visual resource management (VRM) is to manage the quality of the visual environment and to reduce the visual impact of development activities while maintaining the viability of all resource programs. VRM involves applying methods for evaluating landscapes and determining appropriate techniques and strategies for maintaining visual quality and reducing adverse impacts. A summary of the BLM VRM program follows:

- Lands have different visual values that warrant different management
- The VRM inventory system identifies and evaluates visual values
- The results are inventory classes incorporated into the RMP process
- Visual values are considered along with all other multiple resource values during the RMP process to determine VRM objectives; management decisions reflect a multidisciplinary analysis
- VRM objectives established by the RMP provide guidelines for the design and construction of all surface-disturbing activities
- Proposed projects are analyzed using the contrast rating process to determine if management objectives are met and to identify mitigation measures to minimize visual impacts.

Visual Resource Management Classes

The four VRM class objectives are as follows:

Class I – The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.

Class II – The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Class III – The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominate natural features of the characteristic landscape.

Class IV – The objective of this class is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Visual Resource Management within the Planning Area

Implementation of the the BLM's VRM methodology begins with the inventory process. Landscapes are evaluated based on scenic quality, visual sensitivity, and distance zones the distance from the existing network of travel routes). VRM class recommendations are based on the inventory process, and final class determinations are established by the RMP. Current VRM classes for portions of the planning area were established in the Platte River Resource Area Oil and Gas EA (BLM 2003b) (see Table 3-24 and Map 32).

Table 3-24. Visual Resource Management Classes

VRM Class	Acres (BLM-Administered Surface)
Class I	0
Class II	109,827
Class III	210,258
Class IV	953,543
Class V	2,074
Excluded	85,875

Source: BLM 2005a

Five areas in Natrona County were excluded from consideration during the Platte River Resource Area Oil and Gas EA and, as a result, no VRM class determinations have been made for these areas. The excluded areas include the Naval Petroleum Reserve #3, South Bighorns, Salt Creek Hazardous ACEC, and two smaller federal parcels.

Although the planning area continues to be managed in accordance with the classes established in 1981, BLM guidance has subsequently changed. In 1986, the BLM changed the number of VRM classes from five to four (BLM 1986a). The new guidance, along with increased visual intrusions and changing public opinion, necessitated the completion of a new inventory. The inventory was completed in 2004 as part of the current planning effort.

Results from the 2004 VRM inventory illustrate that the majority of the planning area should be classified as VRM Class III and Class IV. This allows for moderate- to large-scale visual intrusions, while striving to preserve the characteristic landscapes. Areas warranting more protections were delineated as Class II and include the South Bighorns, the South Bighorns/Red Wall and the Seminoe/Alcova National Back Country Byways, Fremont Canyon, the Laramie Range, portions of the Rattlesnake Hills, and along the North Platte River. These locations are higher in scenic quality and are much higher in visual sensitivity.

Special recommendations were made concerning NHTs and other historic trail corridors. Visual intrusions within these landscapes impact visitor experiences and the integrity of trail segments where the setting is integral in their historical significance.

Visual Resource Conditions

The condition of visual resources in the planning area varies greatly depending on location, the amount of activity, and the overall character of the landscape. Heavily impacted areas are normally populated with highly visible large-scale facilities or exhibit obvious surface disturbance. High-profile visual intrusions involve concentrated development, such as buildings, industrial facilities, infrastructures associated with oil and gas fields, quarries, and ROW involving surface disturbance. Surface-disturbing activities associated with these areas are readily noticed due to the amount of contrast with the representative landscapes. Portions of the NHTs lie within designated ROW corridors.

Low-profile visual intrusions, which include range improvements, fences, and two-track roads, are found throughout the planning area. Individually, these intrusions provide minimal disturbance to visual resources.

Visual resources in areas of concentrated recreation use near roads and trails may exhibit damage to vegetation, compacted soils, and linear features that contrast with the surrounding landscape. Areas currently exhibiting damage from OHV use within the planning area include public land in the South Bighorns, along the North Platte River, the Casper Canal, Alcova Lake, Kerfoot Creek, Badwater, Sioux Pass, Poison Spider Creek, and the K. Trail.

In addition to describing the VRM classes within the planning area, another aspect of VRM includes identifying rehabilitation areas. These areas, in which the existing visual intrusions exceed acceptable levels and class objectives, should include visual resource mitigation measures. Rehabilitation areas recommended within the planning area include the Salt Creek Oil Field, Casper Canal Shooting Area, Hackalo Quarry, Iron Creek Oil Field, and UMETCO pit/rock quarry on the west end of the Rattlesnake Hills.

Public concerns, including the quality of recreation experiences on public lands, protecting landscapes along NHTs, scenic values and scenic quality, and the costs to develop mitigation present management challenges for the BLM. Other management challenges for VRM include the environmental consequences of concentrated recreational use, degradation caused by the use of OHVs on public lands, overlap of NHTs and utility corridors, effective mitigation along travel routes including National Back Country Byways, data supporting the validity of current VRM classes within the planning area, and monitoring the long-term impacts of management standards and practices. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.6 Land Resources

The land resources topic includes the individual resources of lands and realty, renewable energy, rights-of-way and corridors, transportation, OHV, livestock grazing, and recreation. Each individual resource section includes a definition and description of the resource, the current condition of the resource, management challenges, and management actions.

3.6.1 Lands and Realty

The Casper Field Office lands and realty program is aimed at managing the underlying land base that hosts and supports all resources and management programs. The key activities of the lands and realty program include (1) land use authorizations (e.g., leases and permits, airport leases); (2) land tenure adjustments (e.g., sales, exchanges, donations, purchases); and (3) withdrawals, classifications and other segregations. The BLM works cooperatively to execute the Casper Field office lands and realty program with federal agencies, the State of Wyoming, counties and cities, and other public and private landholders.

Land Use Authorizations

Land use authorizations include various authorizations to use public surface for leases, permits, and easements under Section 302(b) of the FLPMA; R&PP leases under the R&PP Act of June 14, 1926 (43 U.S.C. 869 et seq.); and airport leases under the Act of May 24, 1928, as amended (49 U.S.C. Appendix, Sections 211-213). Past and current conditions associated with these components of land use authorizations are described below.

Leases, Permits, and Easements

Section 302(b) of the FLPMA authorizes the BLM to issue leases, permits, and easements for the use, occupancy, and development of the public lands. The Casper Field Office currently administers one special land use permit on 200 acres issued to the Wyoming Army National Guard for military training purposes near Camp Guernsey. Several permits were issued for short-term use of off-lease public surface associated with oil and gas development. Other permits have been issued for commercial filming projects on a one-time basis. No easements have been authorized.

Recreation and Public Purposes Act Leases and Conveyances

The R&PP Act authorizes the BLM to lease or convey public surface to state and local governments and qualified nonprofit organizations for recreation or public purpose uses. Lands are leased or conveyed for less than fair market value or at no cost for qualified uses. Examples of typical uses under the R&PPA include historic monument sites, campgrounds, schools, parks, public works facilities, and hospitals. Lands usually are leased first until development of the area is completed, and then, if appropriate, a title may be conveyed. The Casper Field Office administers 12 R&PP conveyances covering approximately 2,849 acres, and 14 R&PP leases covering approximately 626 acres.

Airport Leases

No existing airport leases currently are authorized.

Land Tenure Adjustments

The land-ownership pattern in the planning area is diverse. The eastern portion, mostly Platte, Goshen, and eastern Converse counties, have scattered public land parcels that are isolated by large private landholdings. This scattered ownership pattern makes these lands difficult to manage as part of the public land system. The small size of many scattered parcels and their isolation from other parcels of public

land make them of marginal utility to the public. Lack of legal public access diminishes their public utility. Some areas of exception occur, such as along the eastern flank of the Laramie Range west of Wheatland (e.g., Mule Shoe Flats and Cooney Hills), where large parcels are present. In western Converse County and largely throughout Natrona County large blocks of federal land are present, though scattered isolated parcels remain.

Land ownership (or land tenure) adjustment refers to those actions that result in the retention of public land, disposal of public land, or the acquisition by the BLM of nonfederal lands or interests in land. The FLPMA requires that public land be retained in public ownership, unless, as a result of land use planning, disposal of certain parcels is warranted. Tracts of land that are designated in BLM land use plans as potentially available for disposal are more likely to be conveyed out of federal ownership through an exchange rather than a sale. This preference toward exchange over sale is established in BLM policy. Acquisition of lands and interests in lands is an important component of the BLM's land tenure adjustment strategy. Acquisition of lands and interests in land is accomplished through several means, including exchange, purchase, donation, and condemnation, as described below. Lands and interests in lands are acquired for the following actions:

- Improve management of natural resources through consolidation of federal, state, and private lands
- Secure key property necessary to protect endangered species, promote biological diversity, increase recreational opportunities, and preserve archeological and historical resources
- Implement specific acquisitions authorized or directed by acts of Congress.

Exchanges

Exchange is the process of trading lands or interests in lands. Public lands may be exchanged for lands or interests in lands owned by corporations, individuals, or government entities. Exchanges are the primary means by which land acquisition and disposal are carried out. Except for those exchanges that are congressionally mandated or judicially required, exchanges are voluntary and discretionary transactions with willing landowners. Exchanges serve as a viable tool for the BLM to accomplish its goals and mission. The lands to be exchanged must be of approximately equal monetary value and located within the same state. Exchanges must also be in the public interest and in conformance with applicable BLM land use plans.

Land exchanges are used to (1) bring lands and interests in land with high public resource values into public ownership, (2) consolidate land and mineral ownership patterns to achieve more efficient management of resources and BLM programs, and (3) dispose of public land parcels identified for disposal through the planning process.

Only modest exchange activity has taken place in recent years within the planning area, although interest in exchanges continues to increase. Recent exchanges resulted in the acquisition of approximately 5,914 acres of private land in the South Bighorns area and approximately 656 acres of private land in the Pine Mountain area.

Purchases

The BLM has the authority, under Section 205 of the FLPMA, to purchase lands or interests in lands. Similar to other acquisitions, purchase is used to acquire key natural resources or to acquire legal ownership to lands that enhance the management of existing public lands and resources. Acquiring lands and interests in lands through purchase helps consolidate management areas to strengthen resource

protection. Purchases are used primarily to enhance recreation opportunities and acquire crucial wildlife habitats.

Acquisition of land by purchase is used sparingly given the limited funds available through appropriations. Only one land purchase using appropriated funds was completed in the planning area. One other purchase was completed using monies from the Land and Water Conservation Fund.

Donations and Condemnations

The BLM occasionally receives gifts or donations of lands or interests in land when an entity elects not to receive the market value for the interests being conveyed. Two access easements were donated to the BLM by the State of Wyoming for the Muddy Mountain access road. The city of Casper donated two easements for roads and utilities, as well as approximately 10 acres of land to the BLM for the National Historic Interpretive Trail Center in Casper. Acquisition by condemnation is rare and has not been used by the BLM for any acquisition in the planning area.

Land Sales

Section 203 of the FLPMA authorizes the sale of public lands. The objective of BLM land sales is to provide a means for disposal of public lands that are found, through the land use planning process, to be suitable for disposal. Public lands must be sold at not less than fair market value and meet the sale criteria of the FLPMA. Properties identified for disposal, restricted disposal, or retention are identified in Appendix G.

Section 209 of the FLPMA authorizes the conveyance of federal minerals through sale and specifies the conditions under which the mineral rights will be conveyed. The mineral rights may be sold with the land surface, soldas a separate transaction, or retained by the United States. Conveyance of mineral rights has occurred only in conjunction with sale of land surface.

The following sale activity shows the limited nature of land sales within the Casper planning area:

- In 1986, 14 parcels in the Goshen Hole area of Platte and Goshen counties totaling approximately 1,042 acres were sold.
- In 1987, 280 acres were sold to Umetco Minerals Corporation to accommodate a uranium mill tailings disposal site.
- In 1992, approximately 70 acres were sold to the town of Midwest to meet their needs for a sanitary landfill.
- In 1992, 2.5 acres were sold to a family in fulfillment of their 20-year commitment toward developing a cabin site under a small tract lease.

Withdrawals and Classifications

A withdrawal is a formal action that sets aside, withholds, or reserves federal lands for public purposes. Withdrawals accomplish one or more of the following:

- Transfer total or partial jurisdiction of federal land between federal agencies
- Dedicate federal land to a specific purpose
- Segregate (close) federal land from operation of some or all of the public land laws and (or) mineral laws. All the existing withdrawals segregate from operation of the public land laws, unless the surface estate is in nonfederal ownership. As used in terms of withdrawals, the public

land laws refer to the body of laws governing land disposal, such as sales and exchanges. No existing or proposed withdrawal segregates from mineral material disposal, meaning that no withdrawal closes the land to permits or contracts for disposal of sand and gravel or common varieties of building materials. Only four withdrawals (Naval Petroleum Reserve No. 3, Fort Laramie National Historic Site, Spook Site, and Camp Guernsey) segregate from operation of the mineral leasing laws. This precludes applications to lease the land under the Mineral Leasing Act for minerals such as oil and gas, coal, sodium, phosphates, and others. Most of the withdrawals segregate from operation of the mining laws. The exceptions include national forest and national grasslands, stock driveways (SDW), public water reserves, and some, but not all reclamation withdrawals. This means the land is closed to filing mining claims and prospecting for locatable minerals such as gold, silver, uranium, bentonite, and others.

Table 3-25 lists existing withdrawals. Included in the table are existing withdrawals established by the BLM to close specific sites and to protect the existing resource values, as well as withdrawals transferring public land to other federal agencies to accomplish their mission goals. This land use plan will make decisions recommending the continuation, revocation, or enlargement of existing BLM withdrawals and about establishing new BLM withdrawals. This land use plan also will consider transferring additional public land to other federal agencies through withdrawal, where additional public land is needed to accomplish their mission goals.

This plan will not make decisions on revocation of other federal agency existing withdrawals. However, this plan does recognize that should a withdrawal be revoked by action of another federal agency, those lands that are suitable for return to public land status for management by the BLM will be managed in the same fashion as adjoining public lands.
Land classification is a process required under specific laws to determine the suitability of public lands for certain types of disposal or lease, or suitability for retention and multiple use management. Most land classifications also segregate public lands from operation of some or all of the public land laws and (or) mineral laws. Table 3-25 shows existing site-specific classifications.

Lands proposed to be leased or conveyed under the R&PP Act must first be classified as suitable for such use. R&PP classifications segregate the land from operation of the public land laws except for the R&PP Act, which precludes disposal by sale, exchange or other means, but specifically allows for R&PP lease or conveyance. R&PP classifications also segregate from operation of the mining laws, closing the area to mining of locatable minerals. R&PP classifications do not segregate from mineral leasing. R&PP leases and conveyances reserve all minerals in the land to the United Sates. In accordance with 43 CFR 3809.2(a), this land use plan will make decisions about continuation or termination of the segregation on the reserved locatable mineral estate in land that was classified and conveyed under the R&PP Act. Lands that are classified and leased under the R&PP Act remain segregated.

Table 3-25. Existing Withdrawals, Classifications, and Other Segregations in the Casper Planning Area

Name	Acres
Special Management Areas	
North Platte River	3,226
Resource Protection	
Fremont Canyon (Classification and Multiple Use)	0
Muddy Mountain (Classification and Multiple Use)	1,027
Public Water Reserves	1,389
Stock Driveways	101,636
Table Mountain, Bump-Sullivan, and Springer (Classification and Multiple Use)	2,018
Classifications	
Coal Classifications	417,000
R&PP Classifications	3,468
Other Segregations	
Exchange Land	10,566
Sale Land	1,219
Other Federal Agency Withdrawals	
Air Navigation Site (Federal Aviation Administration)	198
Camp Guernsey	5,620
Fort Laramie National Historic Site (National Park Service)	792
Grey Reef Power Site (Federal Emergency Regulatory Commission)	29
Mill Tailings Spook Site (U.S. Department of Energy)	90
National Forests (U.S. Forest Service)	81,768
Thunder Basin National Grasslands (U.S. Forest Service)	163,238
National Wildlife Refuge (U.S. Fish and Wildlife Service)	7,458
Naval Petroleum Reserve Number 3 (U.S. Department of Energy)	9,324
Reclamation (U.S. Bureau of Reclamation)	18,078

Source: BLM 2005a

Note: Due to overlapping resources, numbers are not additive.

R&PP Recreation and Public Purposes

Several existing classifications were established under the 1964 Classification and Multiple Use Act. The lands were classified for retention and multiple use management, and against sale, agricultural entry, and mining location, but remain open to mineral leasing. Table Mountain, Springer, Bump Sullivan, Muddy Mountain, and Fremont Canyon area are included within this group of classifications. This land use plan will review these existing classifications and determine if the segregations they provide are still necessary and need to remain in place. If the segregation imposed by the classification is still appropriate, the BLM will pursue a formal withdrawal of the land and this plan will establish the parameters of any formal withdrawal action.

Coal withdrawals segregate lands from entry under the public lands laws and from the nonmetalliferous mining laws, pending classification of the coal potential within those lands. They remain open to mineral leasing and entry. Subsequent legislation including the 1909 and 1910 coal acts allowing nonmineral entry on coal lands, and the 1920 Mineral Leasing Act, as amended by the Federal Coal Leasing Amendments Act, have effectively replaced the need for coal withdrawals and subsequent classification of the coal potential. This land use plan will make decisions concerning the need for continuing these coal withdrawals and classifications and the accompanying segregation.

Other segregations result from a variety of actions, such as exchanges and land sales where the federal mineral rights are reserved to the United States in the land patent. Table 3-25 lists other segregations of this type.

Locatable federal minerals reserved to the United States in a land exchange or land sale completed under authority of the FLPMA are segregated from operation of the mining laws. This segregation is the result of language in the FLPMA, to the effect that such reserved federal mineral rights are not available for entry until regulations are promulgated providing for such entry. This is the same segregation affecting reserved federal minerals in R&PP conveyances discussed above. The implementing regulations were enacted on November 21, 2000 (65 FR 70112), at 43 CFR 3809.2(a). In accordance with these regulations, this land use plan will make decisions about continuation or termination of the segregation on the reserved locatable minerals in land that was conveyed by exchange or sale.

Management challenges identified for lands and realty in the planning area are based, in part, on historic activities and trends, as well as on current and future needs of public resources and internal and external customers. Management challenges include managing BLM lands to adequately meet the needs of multiple uses per the FLPMA; improving the management of natural resources; obtaining important lands needed for the protection of endangered species, enhancing biological diversity, increasing recreational opportunities, and preserving archeological and historical resources; bringing into public ownership lands and interests in land with high public resource values; consolidating land and mineral ownership patterns for more streamlined management of resources and BLM programs; and disposing of lands identified for disposal.

Management actions for lands and realty generally address meeting the needs of internal and external customers through lease and permits, land-tenure adjustments, and withdrawals. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.6.2 Renewable Energy

Renewable energy generally is defined as energy derived from sources such as wind, solar, and biomass. Wind energy refers to the kinetic energy generated from wind produced by power-generating turbines. Solar energy includes electricity from photovoltaic panels. Bioenergy from biomass refers to energy from organic waste products that are either burned directly or converted to fuels that can be burned to produce energy.

Wyoming has one of the best wind resources in the country; the demand for solar and biomass energy in the state are not as strong. Currently, the operating renewable energy capacity in Wyoming is 284.6 megawatts (MW) of wind energy, 0.05 MW of solar energy, and 0 MW of biomass energy (GAO 2004; Energy Atlas 2004). A recent study, “Assessing the Potential for Renewable Energy on Public Lands,” presented a nationwide overview of renewable resources on BLM lands. In this study, Wyoming was assessed as having a high potential for wind-energy development and lower potentials for solar and biomass energy (BLM 2003e). Currently, no wind farms are located in the planning area. Due to the lack of demand in the near future for development of solar and biomass energy, only wind energy will be discussed in the remainder of this section.

Lands within the planning area have varying wind-energy potentials: approximately 146,129 acres have been classified for outstanding and superb potential; 999,468 acres with excellent, good, or fair potential; and 215,980 acres with poor or marginal potential. Approximately 429,294 acres of BLM-administered surface are open to wind-energy development without use limitations, and approximately 723,619 acres are open but subject to avoidance limitations. Map 42 presents the wind-energy potential for the planning area and Table 3-26 provides information on the wind-power classes referred to in Map 42. The

information displayed in Map 42 and Table 3-26 is derived from U.S. Department of Energy (DOE) National Renewable Energy Laboratory (NREL) wind-energy potential data (NREL 2002). The identified wind-potential areas embrace large geographic areas within which there are numerous areas of land that do not meet the overall classification. A large margin of error is likely in the mapped location and boundaries and, thus, in any acreage calculations.

Table 3-26. Wind-Energy Potential by Wind-Power Class

Wind-Power Class	Resource Potential	Wind Speed (mph)
1	Poor	0-12.5
2	Marginal	12.5-14.3
3	Fair	14.3-15.7
4	Good	15.7-16.8
5	Excellent	16.8-17.9
6	Outstanding	17.9-19.7
7	Superb	> 19.7

Source: NREL 2002

Note: The estimates have been validated by NREL; however, the numbers are just measurements and should be confirmed by direct measurement.

> greater than
mph miles per hour
NREL National Renewable Energy Laboratory

The National Energy Policy encourages the development of renewable energy resources as part of an overall strategy to develop a diverse portfolio of Domestic Energy supplies for the future (National Energy Policy Development Group 2001). The United States wind-power-generating capacity quadrupled between 1990 and 2003 (GAO 2004). It is BLM's general policy to encourage the development of wind-energy in acceptable areas.

Development of renewable energy projects depends on market trends and market value. The demand for renewable energy is illustrated by development projects throughout the west on public and private lands. The importance of renewable energy sources increases in the planning area as nonrenewable energy prices increase and as the need grows for more and cleaner energy sources. Interest in wind-energy development involving BLM-administered lands is increasing in the western United States. At this time, renewable energy development within the planning area is limited to isolated wind-energy development on private lands; however, potential for increased wind-energy development within the planning area exists. Current management does not limit wind-energy development to specific areas or power classes.

Cooperative Management

Due to the wind-energy potential in the west and the associated interest and applications for wind-energy on BLM lands, the BLM prepared a *Final Programmatic Environmental Impact Statement on Wind-Energy Development on BLM-Administered Lands* (BLM 2005h). This EIS will be used by the BLM when considering development of wind-energy resources on BLM-administered lands in the planning area. Management actions for renewable energy generally address development on suitable lands for energy development. These actions are included in the alternatives and are described in more detail in Chapter 2.

3.6.3 Rights-of-Way and Corridors

A rights-of-way (ROW) grant is an authorization to use specific pieces of public land for certain projects, such as developing roads, pipelines, transmission lines, and communication sites. The grant authorizes rights and privileges for a specific use of the land for a specific period of time. In the existing land use plan, ROW corridors were formally designated as the preferred location for existing and future ROW in the planning area.

An important component of the ROW program is the intrastate and interstate transportation of commodities that are ultimately delivered as utility services (e.g., natural gas, electricity) to residential and commercial customers. Equally important on the local level is the growing demand for legal access to private homes and ranches using ROW grants.

The BLM and other agencies (Office of Electricity Delivery and Energy Reliability, Department of Energy, and the USFS) are preparing the West-wide Energy Corridor Programmatic EIS (PEIS). The PEIS will evaluate potential impacts associated with the proposed action to designate corridors on Federal land in the 11 Western States (including Wyoming) for oil, gas and hydrogen pipelines and electricity transmission and distribution facilities. BLM and other agencies issuing the PEIS will amend their respective land use plans by designating a series of energy corridors effective upon signing of the Record(s) of Decision.As of January 2003, more than 1,000 ROW existed in the planning area that were issued under a variety of laws over time and administered according to the conditions specified in the ROW grants. In the 20-year period from 1982 through 2002, 632 ROWs were issued on approximately 9,955 acres of public land in the planning area. On average, 32 ROWs authorizing use of approximately 15 acres per ROW, or 495 acres total per year, are authorized by ROWs in the planning area.

There are eight designated ROW corridors and one designated communication site window with three sites (ROW use areas) in the planning area. ROW corridors encompass 92,113 acres of federal surface lands. Designated Casper Field Office ROW corridors are identified by the Western Utility Group Western Regional Corridor Study (1992).

Most of the proposed ROWs in the planning area are approved, although approvals may be subject to mitigation that may include minor relocation or project modification. Where land use conflicts exist, such as cultural resource values and oil and gas lease development, the project depends on resolving that conflict.

The majority of road ROW and the majority pipeline ROW are directly related to oil and gas lease development (195 APD-related roads compared to 57 other roads and 176 oil and gas pipeline ROW out of 632 total ROWs in the past 20 years). During the 20-year period from 1982 through 2002, four major ROW applications (1983, 1989, 1996, and 2001) were processed and approved by the Casper Field Office. Most of these ROW used designated corridors. This level of major ROW project activity is expected to continue.

In the past 20 years, only two ROW applications have been rejected due to management plan restrictions. In areas currently managed as ROW “exclusion areas,” one proposed ROW application was denied because it was located in the Jackson Canyon ACEC. One in the South Bighorns also was denied, but the need was met by other means (e.g., generator power). Approximately 32 new or amendment ROW applications are processed annually within the Casper Field Office. The ROW corridors are identified in Map 43.

Future needs for existing corridors are not well defined, but the need for power transmission, telecommunication, infrastructure improvements, and pipeline capacity is anticipated. The demand for ROW and corridors is influenced by specific actions within the planning area (such as oil and gas leasing) and by economic forces and other external pressures and conditions that are independent of resource management decisions in the planning area. For example, the demand for expanded infrastructure capabilities throughout the planning area can be dictated largely by state or national needs and requirements. Technological advancements also have brought new demands for public land, largely related to wind energy and telecommunications (e.g., cellular and fiber optic advancements).

Management actions for ROW and corridors include meeting the anticipated needs for power transmission, telecommunication, infrastructure, and pipeline capacity; making public lands available to meet the needs for major ROW customers (e.g., an intrastate pipeline); and making public lands available to meet the needs for smaller ROWs (e.g., roads or pipelines for oil fields, access roads for private homes and ranches). Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.6.4 Transportation

The emphasis of the following discussions is on BLM's transportation program, which includes providing means for legal access to public land and maintenance and development of various transportation facilities. Acquisition of lands and interests in lands, and the tools used to acquire access, are discussed in detail in the Lands and Realty section of this document. ROW to meet transportation needs are addressed in the Rights-of-Way (ROW) and Corridors section of this document. OHV and related issues are discussed in this OHV section.

Access is acquired using several different tools, including purchase, exchange, reciprocal ROW, donation and condemnation. ROW reservations are used to establish and record access roads across private land. Cooperative agreements with land owners are used on occasion, but do not provide long-term legal public access. Both the transportation and ROW programs are active and receive a great deal of public interest because access is important for resource users and managers. Some access that is wanted or needed in the planning area is limited.

As seen in Table 3-27, the BLM currently manages 19 existing easements acquired for public access. Current planning identifies the need for acquisition of access easements on 16 proposed roads or trails.

Management challenges identified for the transportation program in the planning area are based, in part, on historic activities and existing conditions and trends. Management challenges include increased road use based on anticipated increases in oil and natural gas activity and recreational use demand; a road network insufficient to support anticipated expansion of oil and natural gas operations in compliance with the multiple-use concepts within the FLPMA; roads that are no longer needed; and road design and construction considering other resource programs aims to minimize impacts.

The Casper Field Office transportation program aims at managing access to and across public lands. Transportation management areas may be designated and a travel management plan may be developed during RMP implementation to address management challenges. Management actions designed to address the challenges identified in this section are incorporated in the alternatives and described in more detail in Chapter 2.

Table 3-27. Existing and Proposed Access Easements in the Casper Planning Area

Easement	Length (Miles)	Width (Feet)	Area (Acres)
Existing			
Muddy Mountain	0.80	100	9.7
Muddy Mountain	0.12	100	1.45
Muddy Mountain	3.25	100	39.39
Goldeneye Trail (pedestrian trail)	---	---	1.44
Goldeneye Trail (pedestrian trail)	---	---	75.17
Meadow Creek Site (interpretive site)	---	---	1.34
Bucknum	1.36	100	16.48
Bucknum	0.42	100	5.09
Cactus Flat	0.52	100	6.3
Cactus Flat	0.07	100	0.85
Cactus Flat	1.55	100	18.79
Cactus Flat	0.35	100	4.24
Horse Ranch	0.42	70	3.56
Horse Ranch	2.16	70	18.33
Casper Mountain	0.13	30	0.47
Casper Mountain	0.1	30	0.36
Three T	0.36	70	3.05
Pathfinder	0.02	60	0.15
Pathfinder	0.16	90	1.75
Proposed			
Corral Creek	3.50	100	42.42
Bates Creek Reservoir	3.00	100	36.36
Kerfoot Creek	0.50	100	6.06
Alkali Trail	0.75	100	9.09
Horse Ranch	2.50	100	30.3
Hitt	6.50	100	78.79
Big Sulphur	5.75	100	69.7
Canyon Creek	2.25	100	27.27
North Platte River #2	1.25	100	15.15
North Platte River #3	0.25	100	3.03
North Platte River #4	1.50	100	18.18
North Platte River #5	3.25	100	39.39
North Platte River #6	0.50	100	6.06
North Platte River #8	1.50	100	18.18
North Platte River #9	2.00	100	24.24
Upper Laramie River	1.25	100	15.15

Source: BLM 2005a

3.6.5 Off-Highway Vehicles

For legislative purposes, 42 CFR 840 defines an OHV as "any motorized vehicle capable of or designated for, travel on or immediately over land, water, or other terrain." The majority of OHV use on public lands occurs on unpaved roads and two-track trails (Map 49). In the planning area, the most common vehicles used are four-wheel drive trucks and sport utility vehicles. The national objectives for OHV management are to provide for OHV use while protecting natural resources, promoting safety of all users, and minimizing conflicts among the various users of public lands.

OHV Use Within the Planning Area

Road networks within the planning area comprise a series of county roads, BLM-maintained roads, two-track trails, and snowmobile trails. The use of these travelways is an integral part of public land management, as these roads are used for both recreational and nonrecreational purposes.

OHV use is a popular method to explore public lands. OHV use also provides access for nonmotorized recreational purposes, such as fishing, hiking, mountain biking, horseback riding, and primitive camping opportunities.

Nonrecreational OHV use of the planning area includes agricultural management, energy development, and land-management activities. Employees of government agencies, ranchers, energy companies, and utility providers are permitted users who utilize OHVs to access and maintain the infrastructure required for the continued operation and maintenance of their facilities.

BLM has established OHV area designations in accordance with the BLM Land Use Planning Handbook requirements and 43 CFR 8342.1. These designations establish guidelines and limitations for OHV use. Public lands may be designated open, limited, or closed (see OHV Management Designations in the Glossary and Appendix R). The vast majority of OHV use throughout the planning area is limited to existing roads and trails. Exceptions are listed below:

- Muddy Mountain (natural area) and sites along both the Oregon Trail and Bozeman Trail are closed to all types of motorized vehicle use.
- Motorized vehicle use on public lands along the North Platte River from Casper to Alcova or within the Goldeneye Wildlife & Recreation Management Area, Sand Hills, Jackson Canyon ACEC, Muddy Mountain Environmental Education Area (EEA), and Red Wall is limited to designated roads and trails.
- Motorized vehicle use within the Casper Sand Dunes is limited to designated roads and vehicle routes, but this designation reverts to existing roads and trails during the hunting season.
- The Poison Spider OHV Park is open to all types of motorized use.

OHV Use and Environmental Concerns

The OHV designations for the majority of public lands within the planning area are currently either "limited to existing roads and trails" (1,311,715 acres) or "limited to designated roads and trails" (47,014 acres). While these designations provide for a wide variety of OHV use, the majority of recreational OHV use occurs in areas with legal and physical access to large blocks of public lands. The majority of OHV use currently is located in the South Bighorns, in and around the Muddy Mountain EEA, along the North Platte River, and in areas of Bates Hole. The Poison Spider OHV Park (187 acres) has become a popular venue for local OHV enthusiasts and is open to all forms of OHVs (see Recreation section for more information). Approximately 2,661 acres are currently closed to OHV use in the planning area.

The popularity and use of OHVs has grown substantially. Areas that were once infrequently visited are now popular places for recreational touring and other OHV-related activities. However, off-road or other inappropriate use of these vehicles can cause undue environmental degradation and increased conflicts among user groups.

Certain environments are more susceptible to OHV damage, including crucial wildlife habitats, riparian areas, and areas with steep slopes or sensitive soils. Within the planning area, OHV use in the South Bighorns includes the Red Wall area, Bates Hole as defined by the SMAs, North Platte River from Casper to Alcova, and the Muddy Mountains including the area between the EEA and Jackson Canyon are of special concern because of the sensitive nature of these areas. In addition, the Sand Hills are particularly vulnerable to OHV-related impacts; however, this area currently has limited public access.

OHV use will continue into the future. The lack of appropriate signage, a shortage of law enforcement personnel, the increase in OHV use throughout the planning area, and a general lack of understanding of land use ethics have increased inappropriate uses of OHVs on federal lands and represent management challenges for the BLM. OHV damage includes driving off established roads and trails, pioneering unauthorized roads and trails, and associated damage to vegetation and soils. Management actions to address these challenges are included as part of the alternatives described in Chapter 2 of this document.

3.6.6 Livestock Grazing

The BLM is responsible for administering livestock grazing on public land surface across the planning area. Livestock grazing includes the grazing of domestic animals (e.g., cattle, sheep, horses, goats, and bison) within the planning area. BLM-administered public lands are important to local ranch operations particularly in the western half of the planning area (Natrona and western Converse counties). In these areas, the majority of ranch operations lease some public lands. The public lands are almost always intermingled with private and state lands, which are grazed as one unit. Across the planning area there are only a few pastures and just three allotments that contain 100 percent public land. Public lands maintain the integrity of many ranch operations and support the culture, lifestyle, and livelihood of the grazing lessees. In many cases, if ranchers lost their BLM grazing lease(s), the viability of their ranch operation would be seriously affected, thereby making it extremely difficult for them to stay in the livestock business. If forced to sell, many of these ranches would be subject to subdivision, which would result in the loss of important open spaces, view sheds, scenic vistas, and revenues to local economies. In the eastern portion of the planning area, public lands generally are less important to the viability of most of the grazing operations. In this area, BLM-administered public lands usually consist of isolated 40- 80- or 160-acre tracts of land, and the viability of most grazing operations likely would be able to be maintained if the BLM grazing leases were lost.

Animal Unit Month (AUM) Allocations

Lands within the planning area have been used by ranchers for grazing livestock since the latter part of the 19th century. In the early part of the 20th century, there were more sheep than cattle in Wyoming, and Natrona County was one of the largest sheep-producing areas within Wyoming. Sheep numbers reached their peak in the 1920s, but have steadily declined since then.

The Casper Field Office manages lands for livestock grazing in Converse, Goshen, Natrona, and Platte counties; the majority of the lands are in Natrona County. Approximately 1.4-million surface acres of public land are available for grazing within 514 grazing allotments. Grazing allotments typically contain a combination of federal, state, and private lands and range in size from approximately 12 acres to 116,538 acres, with the average allotment size being approximately 8,768 acres. The Casper Field Office administers 462 grazing leases, allowing approximately 182,479 Animal Unit Months (AUMs) of livestock forage. Actual AUM use in the planning area is considered to correspond with authorized AUM

use. Currently, approximately 6,016 acres of BLM-administered public lands are closed to grazing (see Appendix H). Current management evaluates 10 percent of grazing allotments annually to determine whether they meet standards for healthy rangelands.

Grazing systems used on public lands within the planning area fall into the following six categories: yearlong, season long, early season, late season, split season, rotation (i.e., deferred rotation, rest rotation, and time-controlled grazing systems). Of the 462 grazing leases in the planning area, approximately 72 percent (335) authorize yearlong use, which is a reflection of the intermingled land pattern that exists across the planning area, as well as the small percentage of public land found in the majority of allotments. The majority of these ranch operations use pastures containing public land throughout the year; however, this does not mean individual pastures containing public lands are used 12 months of the year.

Table 3-28 shows the number of grazing leases by livestock use category. Of the 462 grazing leases 76 percent authorize cattle only; 9 percent authorize both cattle and sheep; 3 percent authorize cattle, sheep and horses; 1 percent authorizes sheep only; 1 percent authorizes horse only; and less than 1 percent authorizes bison and goats. The use of horses for ranch operations is common and is authorized on 9 percent of the leases. Appendix S describes the guidelines for yearling conversion.

Table 3-28. Livestock Grazing Leases on Lands Administered by the Casper Field Office

Number of Leases	Livestock Use Category
353	Cattle
41	Cattle and Sheep
14	Cattle, Sheep, and Horses
6	Sheep
5	Horses
2	Bison and Goats
41	Horse and Ranch Operations
462	Total

Source: BLM 2005c

The number of AUMs authorized by the Casper Field Office has declined slightly since 1985. This decline is due to changes in ownership from patenting of mining claims, closing areas to grazing, allotment boundary adjustments that have been made with adjoining BLM offices, suspension of AUMs due to rangeland suitability, and land-tenure adjustments. No increases in permitted AUMs in any grazing allotments have occurred since 1985. Population growth is expected to continue around existing cities, which could result in a local decrease in AUMs, especially around Casper.

From 1995 to 2002, livestock production within the planning area accounted for 23 to 25 percent of the total number of breeding sheep and 21 to 27 percent of all cattle and calves in Wyoming. The amount of land leased for grazing ranges from 12 acres to 50,000 acres of public land. Public lands contribute anywhere from 1 to 60 percent of the available forage in some grazing allotments.

SDW withdrawals are authorized under the Stock Raising Homestead Act of 1916 and created by secretarial order for the specific purpose of creating lanes and reserving water sources for trailing livestock. The SDW withdrawals prohibited disposal of these lands, protected water sources, and placed limits on mining activity, but did not withdraw them from locatable mineral entry. For the most part, the SDW are fenced lanes; however, in some areas, they are unfenced through adjacent allotments.

Historically, more than 200 miles of SDWs existed in the planning area (see Map 54). Use of these SDWs is an important part of livestock operations, especially for ranchers trailing livestock between summer and winter ranges. Today, there are two major SDW systems—the 33-Mile SDW and Bates Hole SDW, both of which occur in Natrona County and comprise approximately 46,378 acres and 5,797 AUMs. Annually, the BLM issues trailing permits and supervises the use of these areas. Some segments of the SDWs are seldom used for trailing and, in many cases, have been incorporated into adjacent grazing allotments. Current management uses SDWs to the extent possible; however SDW withdrawals are canceled for trails that are not active. For example, the Orpha SDW in Converse county is now part of a grazing operation and is used for moving livestock between pastures. In 1985, approximately 7,200 cattle and 44,000 sheep were using the SDWs annually. Annual use of the SDWs has dropped as fewer operators use them for trailing, and since 2000, a shift in the number of sheep and cattle using them has occurred (to approximately 17,500 cattle and 27,700 sheep).

Rangeland Health/Productivity

In 1985, the BLM established three categories for allotments to identify areas where management was potentially needed, as well as to prioritize workloads and the use of range-improvement dollars. Allotments were categorized as Improve Existing Resource Conditions (I), Maintain Existing Resource Conditions (M), or Custodial Management (C). When allotments in the planning area were originally categorized, resource conditions in some of the allotments placed in the I category were not necessarily in need of improvement. Criteria that were used to place allotments in the I category included the amount of public land present in the allotment; willingness of lessees to invest in management; opportunities for constructing range improvements; existence of grazing-related resource conflicts; allotment had moderate to high forage production potential and was producing at low to moderate levels; the rancher or the BLM identified opportunities for improvement in range condition; range trend was static or downward; livestock management could be improved through water distribution; seasons of use or other factors; and opportunities existed for a positive economic return on public investments.

Since 1985, the BLM has worked to resolve the issues identified in higher priority allotments. Currently, 46 allotments are categorized as I, 65 are classified as M, and 403 are classified as C (Map 54). The I and M category allotments contain approximately 1,016,314 acres of public land, or 70 percent of the total acreage in the planning area. The majority of the allotments with an I designation in the planning area occur west of Casper in Natrona County; the majority of the allotments with an M designation occur west of Douglas in Natrona and western Converse counties. The primary reason for this distribution of allotments is that the majority of public land occurs in these counties. In the past, allotments in the I category generally received top priority; however, with the current emphasis on evaluating rangeland health on a watershed basis, some management actions may be implemented on M or C category allotments to resolve problems within a watershed. Comparison of range condition data from surveys completed in the 1950s and 1960s and surveys completed in the 1980s and 1990s indicate that the condition of public lands in the planning area has improved due to improved livestock management both by the BLM and grazing lessees.

Changes in federal grazing regulations required the BLM to evaluate rangeland health and manage domestic livestock in accordance with the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the BLM in the State of Wyoming* approved August 12, 1997 (BLM 1998b). The six standards set forth relate primarily to physical and biological features of the landscape and are intended to be within control of the land manager and achievable by the user. These standards relate to all BLM resource programs, and rangeland health can be positively or adversely impacted by any resource program or resource use.

The standards are used to enhance sustainable livestock grazing and wildlife habitat while protecting watersheds and riparian ecosystems. For allotments that do not meet rangeland health standards,

guidelines designed to improve rangeland health are specified in allotment management plans or management agreements. A total of 15 allotments (233,019 acres) currently are operated under allotment management plans, CRM plans, or management agreements. Current management strives to maintain or improve rangeland health on all grazing leases; however, the emphasis is on I and M category allotments and not all allotments in the planning area.

Approximately 10 percent of the public lands in the planning area are assessed annually for rangeland health. By the end of FY 2004, 50 allotments totaling 477,824 acres were evaluated. Twenty-six allotments (280,238 acres) were found to meet rangeland health standards. The remaining 24 allotments (197,586 acres) were found to not be meeting one or more standards. In 2 of the 24 allotments not meeting standards, livestock were determined not to be the primary factor causing degradation of rangeland health. In the remaining 22 allotments not meeting rangeland health standards, past or present livestock uses were determined to be contributing factors. It is important to note that only specific areas (e.g., 15 percent or less of the allotment) of public land within the 22 allotments were failing rangeland health standards.

Other factors contributing to rangeland health degradation include county roads channeling runoff into stream channels adding sediment and changing hydrology; culverts in roads causing headcuts; production water from oil and gas wells that increases bank sloughing and sediment loading; and heavy browse use by wildlife on winter ranges. The rangeland health standards most often not met were Standard #2, which addresses riparian and wetland areas, and Standard #3, which addresses upland plant communities. In upland communities, INPS, poor plant vigor, and composition of plant communities are contributing factors for not meeting Standard #3.

Standards for Healthy Rangelands in Wyoming

- ***Standard #1.*** Within the potential of the ecological site (soil type, landform, climate, and geology), soils are stable and allow for water infiltration to provide for optimal plant growth and minimal surface runoff.
- ***Standard #2.*** Riparian and wetland vegetation has structural, age, and species diversity characteristic of the stage of channel succession and is resilient and capable of recovering from natural and human disturbance in order to provide forage and cover, capture sediment, dissipate energy, and provide for groundwater recharge.
- ***Standard #3.*** Upland vegetation on each ecological site consists of plant communities appropriate to the site that are resilient, diverse, and able to recover from natural and human disturbance.
- ***Standard #4.*** Rangelands are capable of sustaining viable populations and a diversity of native plant and animal species appropriate to the habitat. Habitats that support or could support threatened, endangered, species of special concern, or sensitive species would be maintained or enhanced.
- ***Standard #5.*** Water quality meets state standards.
- ***Standard #6.*** Air quality meets state standards.

Where livestock grazing has been identified as contributing to an allotment failing rangeland health standards, guidelines or BMPs have or will be implemented. The Garrett Allotment is an example where successful guidelines were used to improve grazing and ecological conditions. The 41,562 acres of the Garrett Allotment (Allotment Number 10032) include 20,684 acres of public land, 18,167 acres of private land, and 2,600 acres of state land. In 1998, the BLM determined that while the majority of the public lands in the allotment met rangeland health standards, some of the public lands in three pastures did not. Working cooperatively with the grazing lessee and the WGFD, the BLM implements range improvements to address rangeland health concerns. Prescribed burning, water developments, creation of a riparian pasture, channel stabilization structures, cross fencing to create smaller pastures, and a change in season of use to provide longer periods of rest have improved conditions in the allotment. A segment of Lawn Creek, which was determined to be nonfunctional, is now in PFC. Prescribed burns in the allotment improved forage quantity and quality for both livestock and wildlife and helped improve the distribution of livestock. Additional prescribed burns and other vegetative treatments are being proposed within the allotment.

Monitoring is conducted to determine whether objectives are being met and if adjustments in management need to be made.

Over the last 40 to 50 years, an improvement in range condition has occurred, due largely to improved grazing management practices, development of range improvement projects (e.g., fences and water developments) and, in some cases, reduction in livestock numbers or change in kind of livestock. To various degrees, improvements in range condition generally are anticipated to continue under all alternatives based on vegetation treatment and range-improvement projects and development of guidelines for those areas determined not to meet rangeland health standards. INPS is one factor that may adversely impact the improving trend.

The Missouri River Basin studies, conducted by the BLM between 1952 and 1965, provided baseline data on vegetative types, livestock carrying capacities, and, in some cases, range conditions. The North Platte River Basin Study, 1962, was based on an indepth literature search on historical range condition. The study area includes a large portion of the planning area. A number of journals and observations of frontiersmen from the 1840s to the 1870s were quoted, and old photographs taken in the 1870s were reviewed. The same landscapes were rephotographed in 1958 for comparison. The results of this assessment indicate that range conditions, including sagebrush densities, were much the same in 1958 as they were in 1870.

Two range site and range condition surveys were completed by the BLM on approximately 587,000 acres of rangeland in Natrona County in 1982 and 1994. These surveys indicate that the condition of about 80 percent of the survey area was in good or excellent condition, while about 10 percent of the survey area was in fair or poor condition. The remaining 10 percent included lands that were unclassified and included rock outcrops, slick spots, or areas of disturbance. A comparison of range conditions between the Missouri River Basin surveys and the 1982 and 1994 surveys indicate range conditions improved during the 30-to 40-year period between the two surveys.

Vegetation and rangeland improvement projects have been, and will continue to be, implemented on BLM-administered public lands. Between 1985 and 2004, approximately 430 acres per year were treated with prescribed burns. These projects typically included adjacent landowners and, therefore, encompassed a greater extent of land than reported; however, it is unknown how much more land would be affected by these types of projects within the planning area. An estimated 1,950 acres per year were burned due to wildland fire between 1985 and 2004. Frequently, both planned (i.e., prescribed) and unplanned (i.e., wildland) fires are beneficial to rangeland health, livestock production, wildlife, and watershed health. However, the BLM's policy requiring deferment of livestock grazing for two growing seasons following planned and unplanned fires has and will continue to affect livestock producers.

Rangeland improvement projects can serve as management tools or BMPs to control or improve livestock distribution and use within an allotment. These projects consist primarily of improving fences, reservoirs, springs, water wells, and vegetative treatments. When properly implemented, rangeland improvement projects assist in maintaining or improving rangeland health and increase forage production. On average, the BLM completes 11 to 12 new range improvement projects per year to meet specific management goals and objectives. Table 3-29 shows the range improvement projects completed since 1985.

Table 3-29. The Type and Number of Range Improvement Projects in the Casper Planning Area

Project Type	Projects Completed Since 1985	Total Recorded Number
Reservoirs (Number/Acres)	45/30-50	421
Springs (Number)	25	38
Wells (Number)	26	108
Pipelines (Number/Miles)	24/13.41	27
Fences (Number/Miles)	89/147.5	N/A
Brush Control (Acres)	7,732	N/A

Source: BLM 2005c
N/A Not Available

Management challenges facing the livestock grazing program in the planning area include balancing multiple resource uses such as wildlife use of forage and wildlife compatible fences; ongoing coordination with ranchers, the public, and interested stakeholders; spreading of INPS; developing livestock grazing management strategies that improve allotments not meeting rangeland health standards; and addressing long-term monitoring needs. Management actions anticipated to address these challenges are incorporated in alternatives for livestock grazing and are described in more detail in Chapter 2.

3.6.7 Recreation

Public lands provide a broad spectrum of recreation experience opportunities affording visitors the freedom of recreational choice with minimal regulatory constraints (Map 57). Recreational opportunities are available to the public on all BLM-administered lands where legal access exists. Public access is more readily available in the western portion of planning area.

In addition to managing dispersed recreation throughout the approximate 1.4-million acres in the planning area, the BLM Casper Field Office recreation program also has responsibility for developed recreation sites ranging from minor improvements for parking to multisite hosted campground facilities. The BLM manages four Special Recreation Management Areas (SRMAs) and two National Back Country Byways.

In addition to the recreational uses mentioned, NHTs and other historic trails on public lands receive varying levels of use. NHTs are addressed in the National Historic Trails and Other Historic Trails section of this document. OHV use, an important and growing recreational use of public lands, is addressed in the Off-Highway Vehicles section of this document.

Recreation Management

Management prescriptions on public lands emphasize monitoring, education, and enforcement to reduce user conflicts and to provide resource protection. Monitoring and enforcement of dispersed recreation is limited, especially in areas with a small percentage of public lands or limited access.

The BLM places signs to identify public and private land boundaries, interpret resources, and provide regulatory and informational kiosks in high use areas. Detailed information is available to the public through informational pamphlets, land-ownership maps, and online web sites. Moreover, the BLM promotes educational programs that inform the public and increase awareness. Examples of these programs include Tread Lightly, Leave No Trace, and Operation Respect.

The Casper Field Office administers Special Recreational Permits (SRPs) to manage organized commercial and noncommercial recreation activities. These permits are issued to accommodate six categories of recreational use, as follows: commercial, competitive, vending, individual or group use in

special areas, organized group activity, and event use. Lengths of permits depend on the activities proposed, areas in question, and the past record of the potential permittee. Permits may be issued for periods of time up to 10 years.

The Casper Field Office administers numerous commercial SRPs, most of which authorize professional outfitter and guide services. Others authorize historic trail tours and OHV events.

Special Recreation Management Areas

In accordance with BLM's Land Use Planning Handbook, the BLM has identified SRMAs to manage important recreational resources in the planning area. The primary objective of establishing SRMAs under recreation management zone guidance is to direct recreation program priorities toward areas with high resource values, elevated public concern, or significant amounts of recreational activity. Site-specific Recreation Area Management Plans have been developed for these heavily used areas within the planning area (Appendix O). The planning area SRMAs are summarized below.

- **Muddy Mountain Environmental Education Area (EEA).** The 1,419-acre Muddy Mountain EEA was established in 1977 for recreation and wildlife habitats. Current management of the EEA focuses on environmental education, diverse recreation opportunities, and ecosystem health. Goals and objectives seek to preserve the natural character and wildlife habitats within the EEA. Recreational facilities available in the EEA include two campgrounds with a combined total of 22 campsites and a multiple-use trail system. Part of this trail system includes a national recreation trail that provides universally accessible hiking and interpretation. Camping and day fees are collected at the two campgrounds.

  Current management actions for the Muddy Mountain EEA include an NSO within the EEA boundary, except for forest and recreation management practices. The EEA is closed to livestock grazing. A protective withdrawal also will be established on the EEA that will segregate from operation of the public land laws, including the mining laws, but not the mineral leasing laws.

- **Goldeneye Wildlife and Recreation Area.** The 894-acre Goldeneye Wildlife and Recreation Area is managed exclusively to protect wetland habitats and provide recreational opportunities, specifically fishing. The popularity of the area has varied over the years and fluctuates with the success of stocking efforts by the WGFD and reaching a long-term agreement with Burlington Northern, the current water-right owner. Use of the area is expected to increase dramatically over the next few years if walleye stocking efforts by the WGFD are successful.

  Current management actions for the Goldeneye Wildlife and Recreation Area include an NSO within the boundary, unless the development facilitates recreation use or enhances wildlife habitat; an NSO on BLM-administered lands in Sections 7 and 8, T35N, R82W; an NSO within ½ mile of the shoreline of Goldeneye Reservoir; and an NSO within 600 feet of the Middle Fork of Casper Creek or its tributaries.

- **North Platte River Special Recreation Management Area.** The North Platte River SRMA includes 8 Trappers Route landing sites, the Bessemer Bend Historic site, and 10 riverfront parcels between Casper and the Nebraska state line. The year-round water flow, geologic formations, changing plant communities, and abundance of wildlife all contribute to the recreational experience of visitors at this SRMA. The North Platte River is valued as a Class 1 fishery. For more information, see the Special Designations section of this document.

- **Middle Fork SRMA.** The Casper Field Office manages a portion of the Middle Fork of the Powder River, most of which is located in the Buffalo and Worland BLM field offices. The area provides high quality hunting and fishing and includes two developed recreation sites managed by these offices.

Other areas of high interest to recreational users that are not currently SRMAs include the Poison Spider OHV Park, South Bighorns/Red Wall National Back Country Byway and Seminoe/Alcova National Back Country Byway, the NHTs, and the Casper Field Office Extensive Recreation Management Area, described as follows:

- **Poison Spider OHV Park.** The 187-acre Poison Spider OHV Park, located approximately 15 miles west of Casper, provides visitors opportunities to engage in recreational OHV use, including motorcycle use, all-terrain vehicle use, enduro racing, jeep competition events, and trail events.
- **South Bighorns/Red Wall National Back Country Byway and Seminoe/Alcova National Back Country Byway.** National back country byways offer visitors a variety of recreational opportunities, including driving and touring for pleasure, hunting, camping, fishing, horseback riding, and heritage tourism. See the Special Designations section of this document for more information.
- **National Historic Trails.** See the Special Designations section of this document for more information.
- **Casper Field Office Extensive Recreation Management Area.** The remainder of the planning area (those areas not managed as SRMAs or national back country byways) is managed as an Extensive Recreation Management Area (ERMA), open to dispersed recreational use with minimal regulatory constraints. Occurring in combination with other resource activities, dispersed recreation includes, but is not limited to, sightseeing, touring, photography, wildlife viewing, floating, mountain biking, camping, fishing, and hunting. Fishing and hunting account for the majority of recreation in the planning area. BLM management in ERMAs generally is limited to custodial actions to prevent conflicts between resource uses, provide for health and safety of the public, and provide for health of the lands.

Recreational Use Patterns

Table 3-30 indicates visitation estimates for hunting and fishing for the planning area. These numbers represent the most intensive recreational use in the planning area. Visitor use days related to hunting remain relatively constant over time because they depend on the availability of hunting licenses; they do not depict known increasing recreation trends. Table 3-30 also presents hunting and fishing recreation days for Wyoming, public lands in Wyoming, and public lands within the planning area for 1997 through 2001. These estimates were derived from the percentage of BLM-administered land within the state and from hunting and fishing recreation days. The recreation days used in these calculations are provided by the WGFD (WGFD 2002). Romaniello et al. 2000 developed the calculation method. The results are compared to a USFWS recreation survey conducted in 1996 and were shown to be reliable estimates of recreation use on public lands.

Recreation use trends are expected to increase into the future (Wyoming Travel Industry 2002; Haas 2002; Cole 1996; Mueller et al. 2002). The rising public demand for recreational opportunities will likely increase the complexity of managing dispersed recreation. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

Table 3-30. Hunting and Fishing Recreation Days (1997 to 2001)

Year	Wyoming	BLM (Public Lands Statewide)	Planning Area (Public Lands Only)
1997	5,119,973	1,464,312	111,287
1998	5,670,691	1,621,894	123,263
1999	5,872,695	1,679,590	127,648
2000	5,865,240	1,677,458	127,486
2001	5,682,137	1,625,091	123,507

Sources: BLM 2005c; WGFD 2002

BLM Bureau of Land Management

3.7 Special Designations

ACECs, SMAs, National Back Country Byways, NHTs and Other Historic Trails, and Wild and Scenic Rivers (WSRs) are discussed within the Special Designations section. Areas managed under Special Designations are regulatory or congressionally mandated and are designed to protect or preserve certain qualities or uses. The Casper Field Office currently manages three types of Special Designations (Maps 58 through 66), as well as two ACECs, NHTs, and one National Back Country Byway. A second National Back Country Byway is cooperatively managed with the Rawlins Field Office.

3.7.1 Areas of Critical Environmental Concern and Special Management Areas

Special designations discussed in this section fall into two categories: ACECs and SMAs. Pursuant to the FLPMA of 1976, Section 103(a), an ACEC is defined as an area "within public lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards."

While an ACEC or SMA may emphasize one or more unique resources, other existing multiple-use management can continue within an ACEC so long as the uses do not impair the values for which the ACEC or SMA was established.

There are 2 existing ACECs—Jackson Canyon and Salt Creek Hazardous Area—in the planning area. In addition, 20 areas were nominated for ACEC consideration during the scoping process of the RMP revision, 7 of which met both the relevance and importance criteria and are being carried forward for additional consideration and analysis in the RMP revision (see Appendix P). In addition, 4 of the nominated areas that did not meet the relevance and importance criteria were carried forward for additional analysis as SMAs.

The following discussion covers the two existing and nine proposed special designations within the planning area and is presented in two sections: Existing ACECs and SMAs and Proposed ACECs and SMAs. Table 3-31 provides a summary of the 9 proposed special designations and their values of concern, as well as the two existing ACECs and SMAs.

3.7.1.1 Existing ACECs and SMAs

Jackson Canyon (Existing ACEC)

The Jackson Canyon ACEC is in south-central Natrona County at the western end of Casper Mountain (Map 58). The ACEC encompasses 14,025 acres, of which 3,938 acres are public surface and 11,104 acres are federal minerals. Most private lands within the ACEC are subject to easements held by The Nature Conservancy, generally designed to preserve resources in a natural state and limit development.

The ACEC includes mountainous topography with steep, partially wooded slopes, escarpments, and deeply incised drainages and canyons. The ACEC was established in 1992 to protect bald eagle habitats and two winter roost sites, one in Jackson Canyon and the other in Little Red Creek. Given the sensitive habitats for which the Jackson Canyon ACEC was established, specific decisions were made in the existing plan to restrict uses that were not compatible with bald eagle use. Bald eagle management prescriptions are described in detail in the *Bald Eagle Habitat Management Plan for the Platte River Resource Area and Jackson Canyon ACEC* (BLM 1992a). Current management includes the following:

- All BLM-administered public lands within or adjacent to bald eagle roosts are designated full fire suppression zones. However, to the extent possible, trees are not to be cut within 200 yards of the

roosts during fire suppression. A wildlife biologist shall be present when wildfires threaten an eagle roost.

- Prescribed burning is implemented to meet resource management objectives, but is not permitted from November 1 through March 31.
- NSO or development is allowed.
- Public surface and federal mineral estate is to be withdrawn from location and appropriation under the mining laws.
- Mineral materials are not available for disposal.
- Construction of new roads and other facilities on public lands within or leading directly to the ACEC will not be authorized.
- OHV travel is limited to designated roads and trails.
- OHV travel is prohibited on designated routes from November 1 to March 31.
- Acreages identified for timber harvest are removed from the BLM's commercial base.
- Forest will be actively managed to maintain healthy-aged and structured stands for the benefit of bald eagle roosting habitats.

Management challenges identified for the Jackson Canyon ACEC are forest management issues related to mountain pine beetle infestations, fire management, and OHV use.

Table 3-31. Existing and Proposed ACECs and SMAs in the Casper Planning Area

Area	Existing and Proposed Designation	Value(s) of Concern
Existing ACECs and SMAs		
Jackson Canyon	ACEC	Bald eagle winter communal night roosts and scenic, cultural, and recreational values
Salt Creek Hazardous Area	ACEC	Hazards associated with human activity in the area
Proposed ACECs and SMAs		
Alcova Fossil Area	ACEC or SMA	Rare pterodactyl trackways and additional dinosaur fossils from two geologic periods
Bates Hole	SMA	Sensitive watersheds, soils, and wildlife habitats
Black-tailed Prairie Dog Complex	ACEC	Protection of a keystone prairie species; the USFWS found that the protection of black-tailed prairie dogs is warranted
Cedar Ridge TCP	ACEC or SMA	Prehistoric and historic cultural resources, including a traditional ceremonial site used by the Eastern Shoshone and other tribal groups
North Platte River	ACEC	High recreational and scenic values
Salt Creek	SMA	Oil and gas development potential
Sand Hills	SMA	A variety of natural sand dune communities and sensitive soils
South Bighorns/Red Wall	ACEC or SMA	Crucial wildlife habitat, cultural resources, intact vegetation communities, and outstanding scenery
Wind River Basin	SMA	Oil and gas development potential

ACEC Area of Critical Environmental Concern
SMA Special Management Area
TCP Traditional Cultural Property
USFWS U.S. Fish and Wildlife Service

Salt Creek Hazardous Area (Existing ACEC)

The BLM established the 235,325-acre Salt Creek Hazardous ACEC under the natural hazards criterion of ACEC establishment under Section 103(a) of the FLPMA of 1976. Hazards associated with the Salt Creek ACEC resulted from human activity associated with oil and gas extraction (Map 58). The Salt Creek Hazardous Area ACEC plan provided for the monitoring and sampling of produced water discharge and field inspections on an annual basis, even though monitoring and sampling of produced water discharge are under the jurisdiction of the Wyoming DEQ. The Casper Field Office conducted limited stream monitoring in the ACEC area prior to issuance of the existing RMP, but has not conducted produced water monitoring, sampling, and annual field inspections since the early to mid-1980s. The existing RMP also indicates that the BLM would amend the ACEC plan to provide for inventory and evaluation of historic oil and gas sites, structures, and town sites that may be eligible for nomination to the NRHP.

Since the designation of the ACEC, operators have reduced the amount of environmental hazards in the area by taking their own initiatives and working with the BLM and local communities on a case-by-case basis. Operators also have taken steps to improve the visual quality in the area by reclaiming surface disturbance associated with past oil and gas development. BLM management challenges will continue in the area because of environmental hazards associated with ongoing and future oil and gas development.

3.7.1.2 Proposed ACECs and SMAs

Alcova Fossil Area (Proposed ACEC or SMA)

The Alcova Fossil Area near Alcova Reservoir in southwest Natrona County is proposed for ACEC or SMA designation based on the paleontological resources known to exist within the proposed boundaries (Maps 59 through 62). Values associated with the site include the Alcova Pterodactyl Trackway locality (originally designated as an ACEC in 1980, but the ACEC designation was removed in the existing plan), one of only four such trackway occurrences known worldwide. The individual tracks in the proposed ACEC or SMA are larger than any others found in North America and suggest the animals had a wingspan of 10 feet. Recent research has revealed the presence of additional trackways in the area. In addition, exposed outcrops of the Morrison and Sundance formations in the area contain numerous fossilized remains of marine and terrestrial species from the Triassic and Jurassic periods, including plesiosaurs, ichthyosaurs, *Allosaurus*, and *Camarasaurus*. The potential for discovery of additional paleontological resources in the area is high. The USBR has developed the Dinosaur Trail, a hiking trail with interpretive signs explaining the geology and paleontology, on adjacent lands.

Several instances of theft and vandalism aimed at the paleontological resources have occurred in the past, including theft of the flagstone-type rock preserving the tracks at one trackway. Numerous mining claims also exist in the area. Recreationists heavily use the Alcova Reservoir area.

Bates Hole (Proposed SMA)

Bates Hole is a collective term for the area with boundaries of the Bates Creek and North Platte River-Bolton Creek watersheds. The area is located in southwestern Natrona County and extends into northern Carbon County beyond the planning area (Maps 59, 60, and 62); however, management decisions in this document apply only to the 375,221 acres within the planning area, not the portions of the watersheds that are outside the planning area. The proposed Bates Hole SMA is similar to, though larger than, the resource management unit (RMU 9: Bates Hole) defined in the existing plan. Approximately 288,504 acres of public land, including 158,023 public surface acres fall within the SMA boundary.

Bates Hole SMA will protect highly erosive soils, fragile watersheds, and crucial wildlife habitats within the proposed boundary. Approximately 51,617 acres of highly erosive soils occur on public lands within

the boundary, which represent nearly 15 percent of all the high-water erosion potential soils on public land in the entire planning area. Soils with a high wind-erosion potential within the SMA are not a significant feature (1,330 acres), and comprise less than 1 percent of the high wind-erosion potential soils on public land in the planning area. The dominant vegetation types in the area include sagebrush, forests, woodlands, and shrublands. Sagebrush complexes comprise nearly 40 percent of the area and represent the best quality greater sage-grouse habitats in the planning area and some of the finest habitats in Wyoming. There are 30 identified sage-grouse leks, 111 identified raptor nests, and 122,799 acres of crucial wildlife habitat present on public land within the SMA boundary. Crucial wildlife habitats occupy approximately 43 percent of all public land within the SMA. Some lands within the proposed SMA have been converted to agriculture, urban, and industrial uses.

Portions of the North Platte River also fall within the proposed boundary and include some of the highest quality recreation and fishing opportunities in the planning area, including 17 miles of Class I and 88 miles of Class II waters.

The area proposed as the SMA currently encompasses portions of the Jackson Canyon ACEC, Muddy Mountain EEA, proposed North Platte River ACEC or SRMA, and the Alcova Fossil ACEC or SMA.

Ninety-six percent of the proposed SMA is located in a very low oil and gas development potential area, with the other 4 percent rated as having no development potential. Oil and gas leases on 3,478 acres of federal mineral estate (approximately 1 percent of the SMA) are held by production at Government Bridge, Schrader Flats, and Bates Creek oil and gas fields. An additional 13,174 acres (approximately 3.5 percent of the SMA) are presently leased. The remaining portion of the SMA is presently unleased. These three fields combined produced 17,241 barrels of oil and 2,265 thousand metric feet of natural gas during 2004 (see Table 3-11) and appear to be fully developed. This production represents less than 1 percent of oil and gas production in the Casper Field Office during 2004.
The proposed Bates Hole SMA has high potential for locatable minerals, such as uranium, bentonite, limestone, and jade. Numerous mining claims exist in the area, as well as numerous active mineral material pits.

Black-Tailed Prairie Dog Complex (Proposed ACEC)

Black-tailed prairie dogs, like other prairie dog species, are considered a “keystone species” and, as such, play an important role in the ecosystem. Colonies or towns that the prairie dogs establish include extensive underground tunnels, which can extend up to 10 feet in depth and up to 15 feet horizontally. Prairie dog colonies provide habitats for the endangered black-footed ferret, mountain plover, prairie rattlesnakes, and burrowing owls. Black-tailed prairie dogs also are an important source of food for ferruginous hawks, golden eagles, swift fox, coyotes, black-footed ferrets, and badgers. Largely as a result of habitat destruction, poisoning, and disease, a considerable reduction in historic black-tailed prairie dog ranges has occurred (USFWS 2005b).

The black-tailed prairie dog was petitioned for being listed as a threatened species in July 1998. In August 2004, the USFWS concluded that the black-tailed prairie dog was not likely to become an endangered species in the foreseeable future and was removed as a candidate species. However, the black-tailed prairie dog remains a Wyoming BLM sensitive species. Accordingly, the Casper Field Office evaluates the impact any proposed activity on BLM-administered land may have on black-tailed prairie dogs.

Black-tailed prairie dog towns are scattered throughout the planning area, primarily in Converse, Goshen, and Natrona counties. In 2002 the BLM received a proposal from the National Wildlife Federation to nominate black-tailed prairie dog colonies as an ACEC. One concentration area of black-tailed prairie dog colonies in northern Converse County is nominated as a proposed ACEC. The proposed boundary

for the Black-tailed Prairie Dog ACEC encompasses (T37N, R74W) in the northwestern portion of Converse County. Of the 22,937 acres within this boundary, approximately 3,103 acres (in 8 different parcels) are BLM-administered public surface and 14,846 acres are federal mineral estate.

Oil and gas leases in a portion of the proposed ACEC area (412 acres) are held by production from development at the Phillips Creek Oil and Gas Field. Other portions of the area are presently leased. Oil and gas well spacing is presently one well per 160 acres when developing the Shannon Formation and one well per 640 acres when developing the Frontier Formation. Other oil and gas formations are spaced at one well per 40 acres.

Cedar Ridge Traditional Cultural Property (Proposed ACEC or SMA)

The Cedar Ridge TCP (4,449 acres) and the Periphery (32,710 acres) was proposed as an ACEC or SMA to protect sensitive cultural values present in the area (Maps 59 and 60). Eligible for nomination to the NRHP, the Cedar Ridge site is an extensive prehistoric archeological site containing hundreds of ceremonial structures (e.g., vision quest structures), stone tool-making debris, and fire hearths. The site has been in use for the last 5,000 years and it may have been used as early as 9,000 to 10,000 years ago. The TCP element is of high importance to the Eastern Shoshone in terms of ongoing religious observance. Ceremonial activity is associated with tranquility and any intrusive activities could diminish the suitability of Cedar Ridge for traditional purposes. Cedar Ridge is the only identified Native American TCP in the planning area, although additional sites of sacred or traditional nature could be discovered in the future.

Oil and gas leases in a portion of the area (9,479 acres) are held by production from development at the Madden (Deep) oil and gas field primarily in Fremont County, which is administered by BLM's Lander Field Office. Other portions of the area are presently leased. The Hitchcock Draw Unit (9,640 acres within the proposed boundary) covers most of the eastern half of the TCP and Periphery and the leases in this unit also are held by production.

Numerous mining claims occur in the area. In addition, an increased interest in uranium in this area has increased filings of new mining claims.

North Platte River (Proposed ACEC)

Public lands along the North Platte River below Gray Reef Dam currently are managed as an SRMA and support numerous species of flora and fauna. The riparian habitats in the North Platte River (Map 58) are important in a cold desert environment, as they represent only 1 percent of Wyoming's land area. The riparian area adjacent to the river provides year-round habitats for pronghorn, mule deer, and white-tailed deer. Many species of birds also are found here. Important winter-feeding grounds for bald and golden eagles are located downstream from Gray Reef Dam. The river also provides for aquatic-based recreation.

The North Platte River supports at least 18 species of fish. Stocked with rainbow trout, it is a destination fishery and 1 of only 12 Blue Ribbon streams in Wyoming. The river section from Gray Reef Dam to Goose Egg Bridge (Reefs section) ranks second only to the Miracle Mile section some distance upstream outside the planning area. The latest estimates rank the Reefs section as the largest trout population in Wyoming, with the stretch of river near Bessemer Bend ranking fourth (WGFD 2004d). Blue Ribbon streams are identified as a Wyoming Game and Fish "vital habitat," defined as follows:

> "*habitat [that] directly limits a community, population, or subpopulation, and restoration or replacement may not be possible. The [Wyoming Game and Fish] Department is directed by the Commission to recommend no loss of habitat function. Some modifications of habitat*

> *characteristics may occur, provided habitat function is maintained (i.e., the location, essential features, and species supported are unchanged)." (*WGFD 2004d)

In addition to its regional importance as a recreational resource, the North Platte River is historically significant because of its use as a main conduit for settlers heading west during the mid 1800s. The Oregon, Mormon Pioneer, California, and Pony Express trails all follow the river from the Nebraska state line to Bessemer Bend, just west of Casper.

Salt Creek (Proposed SMA)

The Salt Creek SMA falls completely within the boundary of the existing Salt Creek Hazardous ACEC and facilitates oil and gas exploration and development in the Salt Creek oil field area (Maps 60 through 62). The drilling of the No. 1 Salt Creek (or No. 1 Dutch) in October 1908 opened Salt Creek as one of the most productive fields in the Rocky Mountains. Based on data from the WOGCC, the Salt Creek oil field has produced about 671-million barrels of oil and 723-billion cubic feet of gas as of October 2003 (BLM 2005f). Salt Creek is the oldest and largest oil field in the southern Powder River Basin, the largest sweet oil-producing field in the world, and is currently the third largest oil producer in Wyoming (BLM 2005f). In 2002, Salt Creek produced 36 percent of the total oil produced in the planning area, and well over half of the original oil-in-place in Salt Creek is still there (BLM 2005f). In addition, the implementation of a carbon dioxide flood began in the Salt Creek field in 2002 and will continue for the next 10 years.

After a century of oil and gas development, the Salt Creek oil field area provides important grazing resources and habitats for nesting raptors, black-tailed prairie dogs, mule deer, pronghorn, and other birds and small mammals. The area contains prehistoric archeology sites, historic oil field sites, the Bozeman Trail, and provides for limited recreational opportunities in the form of hunting.

Sand Hills (Proposed SMA)

The approximately 17,633 acre Sand Hills area in east-central Natrona and west-central Converse counties is identified for special management to maintain the integrity of soils and vegetation and to protect highly erosive soils (Maps 59, 60, and 62). Soils in the area are susceptible to moderate to severe wind and water erosion. Ninety-five percent of the proposed SMA has been identified as having high wind-erosion potential, which is nearly one quarter of all high wind-erosion soils on public surface in the planning area. Sand dunes are a dominant feature in the area and provide visual relief from the surrounding landscape. Although the area contains examples of both active and inactive dunes, the majority of the area is stabilized by vegetation. The sand dunes vary in length from 100 to 500 yards; some reach a height of 300 feet. Pioneer native grasses can be observed on many of the dunes.

While a number of sand hills and sand dunes occur in other areas of Wyoming and the Rocky Mountain System, the Sand Hills area occurs in close proximity to Casper and mostly comprises public lands (both surface and mineral estate) within the boundary of the proposed SMA. The Sand Hills area is a system that provides habitats for big game and nongame species. Approximately 13 percent of the area is considered to be a crucial wildlife habitat. No sage-grouse leks and only one raptor nest have been identified within the proposed SMA. A segment of the Bozeman Trail passes through the center of the proposed SMA. Sand dunes within the proposed Sand Hills SMA may meet habitat requirements for blowout penstemon which is adapted to blowout dunes habitat that are caused and maintained by wind erosion. As described in the Special Status Species – Plants section of this document, one management requirement for recovery of blowout penstemon is creating favorable conditions for colonization of new sites.

Livestock grazing is a traditional and historic land use in the area and oil and gas development has occurred in this area since the late 1950s. The area has low-to-moderate development potential for oil and gas. No roads provide legal public access to the Sand Hills. Bladed and gravel roads, as well as unimproved two-track roads, are present in the Sand Hills and serve oil facilities and local ranches. Oil and gas leases in a portion of the area (3,172 acres) are held by production from development at Cole Creek and South Cole Creek. Other portions of the area are leased (10,265 acres) and approximately 42 percent is unleased (7,368 acres).

Ninety-eight percent of the proposed SMA is identified as having low oil and gas development potential; however, a multimillion-dollar three-dimensional geophysical project was recently completed in this area, which could lead to further development and leasing of the area.

No known mining claims occur within the area; however, numerous mining claims for uranium recently have been filed adjacent to the proposed SMA along the northeastern boundary.

South Bighorns/Red Wall (Proposed ACEC or SMA)

The South Bighorns/Red Wall complex includes wildlife habitats, unique vegetation, cultural and historic values, and a high value recreation area (Maps 59, 60, and 62). A comprehensive perspective on management of the Southern Bighorns is described in *The Past, Present and Future Management of the Southern Big Horns* (Bennett 2001). The South Bighorns/Red Wall area generally coincides with the Resource Management Unit (RMU) Number 1 as defined and mapped in the 1985 Platte River Resource Area Resource Management Plan.

The area encompasses mule deer crucial winter range, elk crucial winter range, and sage-grouse habitats. The Red Wall/Gray Wall provides nesting habitats for a variety of raptor species and contributes to the visual quality of the area. The area also contains a unique plant community, curl-leaf mountain mahogany, which is a component of big game crucial winter ranges. Curl-leaf mountain mahogany is an important fall and winter forage for deer and elk and is utilized by livestock. Forests and woodlands provide hiding, escape, and thermal cover for wildlife and provide a small commercial source of wood products. Mountain big sagebrush communities present in the area support a wide variety of wildlife species, as an important food source and as hiding and nesting cover. In addition, the area provides habitats for a variety of wildlife, such as the mountain lion, swift fox, marmot, greater sage-grouse, Hungarian partridge, and various migratory bird species.

The South Bighorns/Red Wall area exhibits a dense and diverse range of cultural and historical resources rivaling that found anywhere within Wyoming, including portions of the Cedar Ridge TCP and the Hole-in-the-Wall region. Evidence that supports Native American use in the South Bighorns includes numerous temporary camps, stone-tool manufacturing localities, and food preparation and processing sites. Native American religious practitioners have identified stone circles found on exposed ridges as having religious significance. The South Bighorns provided several important travel routes used by Native Americans, pioneers, and outlaws.

The area is traversed by the South Bighorns/Red Wall National Back Country Byway, designated in 1990 and originating from two important SDWs, the Arminto and 33-Mile. These SDWs are still used today by the local ranching community, are two of the longest SDWs in the west, and were the first to be established in Wyoming. A sheepherder's monument is located at the intersection of these two SDWs. The National Back Country Byway provides access to the area, which offers numerous recreation opportunities, such as camping, hiking, fishing, hunting, and sightseeing. There are two BLM campgrounds within the area accessed by the national back country byway. Recreational OHV use is increasing and is intensive during the hunting season.

The South Bighorns/Red Wall area has high scenic values. The Chugwater Formation interrupts gentle flowing lines with steep vertical escarpments. The most prominent attribute of the Chugwater Formation is its striking crimson color. Buffalo Creek and Badwater Creek canyons, as well as numerous lesser canyons, dissect the area and add important diversity and richness to the visual quality.

Oil and gas leases in a small portion of the area (1,102 acres) are held by production from development at the Madden (Deep) oil and gas field primarily in Fremont County, which is administered by BLM's Lander Field Office. Approximately 20,179 acres, of which 12,539 acres is public surface and 20,179 acres are federal mineral estate, are closed to oil and gas leasing. Presently, a well is being drilled in the Hitchcock Draw Unit (8,277 acres is within the proposed ACEC or SMA). If this well is productive, the leases in this unit also is held by production. The majority of the area rates as having low-to-no oil and gas production potential.

Numerous mining claims occur in the area. An increased interest in uranium has increased filings of new mining claims in the area. There are three active sand and gravel permits in the area; two are free-use permits and the other is a negotiated contract. In addition, there are talc and soapstone claims, with some copper exploration, in the area west of Grave Springs Campground along the EK Trail.

Wind River Basin (Proposed SMA)

Improvements in hydraulic fracturing technology have encouraged extensive oil and gas development in parts of the Wind River Basin lying within the planning area. The proposed Wind River Basin SMA lies in the western portion of Natrona County (Maps 60 through 62) and the Casper Field Office manages it to facilitate oil and gas production.

Although gas production in the planning area declined from 100-to 63-billion cubic feet per year since 1999, drilling in the eastern Wind River Basin portion of the planning area may reverse or at least flatten the decline during the next few years. In addition, the eastern portion of the Wind River Basin is prospective for additional discoveries of natural gas (BLM 2005f).

Estimates for the gas-in-place resource for the portion of the Wind River Basin lying within the planning area range from approximately 228-trillion cubic feet to 268-trillion cubic feet. The estimate for deep gas-in-place is approximately 72-trillion cubic feet present within that part of the Wind River Basin that lies within the planning area (BLM 2005f).

The Wind River Basin provides a diversity of habitats for numerous plant and wildlife species, including mule deer, pronghorn, and various special status species such as the mountain plover, white-tailed prairie dog, raptors, and greater sage-grouse. Portions of the Wind River Basin contain crucial winter ranges for both mule deer and pronghorn. The basin also contains sagebrush habitats for the greater sage-grouse and other sagebrush obligates. The Wind River Basin also contains a large number of prehistoric archeology sites and the Bridger Trail.

The proposed Wind River Basin SMA is managed for energy development. By not applying discretionary timing restrictions for big game crucial winter ranges, and raptor, mountain plover, and greater sage-grouse nesting habitats within the proposed boundaries of the proposed SMA, larger windows of time are provided not only for drilling of new wells but also for reclamation operations. Compliance with federal laws, such as the ESA and Migratory Bird Treaty Act, are still required throughout the SMA area.

Currently, the greater sage-grouse and mountain plover are recognized as Wyoming BLM sensitive species. This designation requires the BLM to ensure that actions on public surface and federal mineral

estate consider the welfare of these species and do not contribute to the need to list the species under the ESA.

3.7.2 National Back Country Byways

The BLM began a byway program in 1989 with a focus on enhancing recreational opportunities. A National Scenic Byway System was created 2 years later under Section 1047 of the Intermodal Surface Transportation Efficiency Act of 1991. This act recognized the BLM National Back Country and Scenic Byways as a component of the National Scenic Byway System (Section 1032, eligible projects). The objectives of this program are to do the following:

- Enhance opportunities for the American public to see and enjoy the unique scenic and historical opportunities on public lands
- Foster partnerships at local, state, and national levels
- Contribute to local economies
- Enhance the visitor's recreation experience and communicate the multi-use management message through effective interpretative programs
- Manage visitor use along the byway to minimize impacts to the environment and to provide protection for the visitor
- Contribute to the National Scenic Byway Program in a way that is uniquely suited to national public lands managed by the BLM.

Two travel routes in the planning area are included in the National Scenic Byway System: (1) South Bighorns/Red Wall National Back Country Byway designated in 1990, and (2) a portion of the Seminoe/Alcova National Back Country Byway (Map 63). Both routes offer recreational enthusiasts the opportunity to explore central Wyoming's natural beauty and remote landscapes. The majority of visitation in the South Bighorns/Red Wall National Back Country Byway occurs during the fall hunting season, while most visitation of the Seminoe byway occurs during the summer season. Visitation use along the byways continues to increase, paralleling overall increases in outdoor recreation (BLM 2005c).

South Bighorns/Red Wall National Back Country Byway

The South Bighorns/Red Wall National Back Country Byway is approximately 102 miles long and traverses the South Bighorns in northwest Natrona County. This byway primarily comprises the Arminto (county roads 105 and 109) and 33-Mile (County Road 110) SDWs. These SDWs are still used by the local ranching communities and were among the first to be established in Wyoming (BLM 1992d). A sheepherder's monument is located at the intersection of these two SDWs. The byway also includes Buffalo Creek Road (County Road 105) and the Bighorn Mountain Road (County Road 109).

The South Bighorns/Red Wall National Back Country Byway offers numerous recreational opportunities, such as camping, hiking, fishing, hunting, and sightseeing. Grave Spring and Buffalo Creek campgrounds are administered by the BLM and are located on the upper loop of the byway along County Road 105. Specific management prescriptions for the unit are in place for the protection of sensitive soils, wildlife habitats, visual resources, and important cultural and historical sites. Interpretive kiosks, which include a map of the area, have been placed at both ends of the byway.

Seminoe/Alcova National Back Country Byway

The Seminoe/Alcova National Back Country Byway begins off Highway 220, 30 miles southwest of Casper, and is located in and administered by two BLM field offices (Casper and Rawlins). This route passes Alcova, Pathfinder, Kortes, and Seminoe reservoirs. Lands along this byway providing public recreational opportunities are managed by the BLM, USBR, and the Wyoming State Parks Department. Common recreational uses of this area include boating, rock climbing, camping, fishing, and sightseeing. Special attractions include Miracle Mile, the North Platte River, Seminoe State Park, and Alcova Reservoir. The northern end (approximately 11 miles) of this travel corridor is located within the planning area along County Road 407. The dominant resource values for the area are fossils (pterodactyl track area), recreation, and raptor habitats.

3.7.3 National Historic Trails and Other Historic Trails

In 1968, the National Trails System Act provided for the development of a national system of trails in urban, rural, and wilderness settings. Originally, the Act specified three categories of National Trails: scenic trails, recreation trails, and connecting or side trails. In 1978, historic trails were added as another category. Today, only Congress can designate NHTs. In 1995, the National Park Service (NPS) established the National Trails System Office in Salt Lake City, Utah, which administers the Oregon, California, Mormon Pioneer, and Pony Express NHTs. The National Trails System does not manage trail resources on a day-to-day basis; rather, the responsibility for managing trail resources remains in the hands of current trail managers at the federal, state, local, and private levels.

Four NHTs and other historic trails of regional and national significance cross the planning area. The four NHTs are formally known as the "Oregon-California-Mormon Pioneer-Pony Express Trail," but generically as the Oregon Trail because the routes overlap in many areas. The NHTs are associated with sites such as Fort Caspar and Fort Laramie. These routes, along with others (Bozeman and Bridger trails) were major thoroughfares for westward expansion, military campaigns, and to the gold fields of California, Idaho, and Montana. John Bozeman's shorter route to the Montana mining area was one of the catalysts of the Plains Indian wars in the latter half of the 19th Century. Additionally, the Texas Trail, the Cheyenne Deadwood Stage Road, and other historic roads were routes important at a regional level, opening central Wyoming to settlement, commerce, agriculture, industry, and travel.

Congress designated the Oregon and Mormon Pioneer trails as NHTs in November 1978. The purpose of that Act was to identify and protect the trails, along with their historic remnants and artifacts, for public use and enjoyment. The Act also directed the Secretary of the Interior to prepare comprehensive management plans and to adopt uniform markers for both trails (BLM 1986a).

The Bozeman and Bridger trails originate in the planning area. The Bozeman Trail, portions of which are on the National Register as part of a Wyoming thematic nomination (*Bozeman Trail Properties in Wyoming*), was first used by gold seekers in the 1860s as a shortcut to the Montana goldfields, and later used as a military and, subsequently, as a freight road. The Bridger Trail was formalized in the 1860s as well, providing a safer route to the mining areas. NHTs and other historic trail segments can be found on public and private land within the planning area. The Oregon Trail complex stretches 197.0 miles, but is more than 550 miles overall when all routes and variants are included. Altogether, 22.5 miles of trail cross public surface. The Bozeman Trail crosses 60.5 miles of public surface with 87.0 miles lying on private and state lands. The Bridger Trail has 18.3 miles of public surface and 45.9 miles on private or state lands.

Use and Condition of National Historic Trails and Other Historic Trails in the Planning Area

Physically, conditions of the trails range from highly visible, well-developed ruts to segments evidenced only by shallow swales or changes in vegetation to segments where the trail is no longer visible. Segments lacking physical integrity may have been covered by wind- or water-born sediments, or may have been eradicated by erosion. Modern roadways have covered many trail segments, since good travel routes continued to be used until the present. The trail setting has varying degrees of historic integrity.

Both intentional and incidental tourists visit NHTs and other historic trails in the planning area . Portions of the trails can be explored from the comfort of cars and paved surfaces, by hiking, and by horseback. To enhance the experience, there are interpretive developments at Bessemer Bend, Emigrant Gap, and Ryan Hill. The Fort Laramie National Historic Place, managed by the NPS, began as a trading post and developed into a major supply point on the emigrant trails. The interpretive sites are of particular interest to a growing number of heritage tourists, but are also visited by individuals who have only a passing interest in the trails. In recent years, visitor numbers increased at all the locations where visitor numbers are documented. At the National Historic Trails Interpretive Center in Casper, visitor numbers are on a slow but steady increase. This may indicate that professional and citizen interest in NHTs and other historic trails is on the rise. Preservation groups, such as the Oregon/California Trail Association, the Wyoming Archaeological Society, and the Wyoming Historical Society, as well as individual historians and researchers, have a great deal of interest in the interpretive efforts.

Current Management

Because NHTs are unique cultural resources with high public interest, they warrant special management consideration within the planning area. Guidelines have been developed specifically for the trails that allow more precise management planning than is possible for other broad categories of historic or prehistoric cultural resources. The *Oregon/Mormon Pioneer National Historic Trails Management Plan* (BLM 1986a) was prepared in 1986 to guide BLM management of the NHTs and cutoffs. Appendix IV of the *Trails Management Plan* provided specific "Guidelines for the Evaluation and Protection of Historic Wagon Trails" that applied to all historic trails of national, regional, or local significance. Trails within the planning area subsequently have been managed and protected using these guidelines.

Historic trails are among the most difficult resources to manage because of "their varying degrees of preservation and diverse range of environmental settings" (BLM 1986a). The guidelines specifically focus on (1) historical significance and use, (2) the integrity of setting of the trail segment, and (3) the physical integrity of the trail ruts and swales.

Increased pressure as a result of the cumulative impacts of development and especially large-scale projects spurred the BLM to consider the setting for historic trails and to develop a larger statewide context. Current management prescriptions relating to management of trails are detailed in the existing plan Record of Decision.

In 2000 and 2001, BLM personnel used Global Positioning System (GPS) to map the NHT system in Wyoming. This was a preliminary step in a statewide re-evaluation of the historic trails based on their physical remains and overall setting. The results will be used to determine appropriate management or mitigation, including such considerations as settings, trail conditions, limitations on development, and guidelines for recreational trail use.

NHTs currently are managed in the existing plan under Land Use Decisions C-2 (BLM 1985a) and M-1 (BLM 1985c), which specifically address NHTs; Decision C-3 covers tracts on the Bozeman Trail. Under these decisions, sites along the Oregon NHT and the Mormon Pioneer NHT are managed to promote and protect from adverse impacts their significant cultural, scientific, and recreational values, as

outlined in the NPS's *Oregon Trail Comprehensive Management Plan* (NPS 1981). No surface development is allowed on the following sites: Fort Laramie, Old Bedlam, "Prospect" (Ryan) Hill, Horse Creek, Emigrant Gap, Bessemer Bend, Platte Island, Sergeant Custard, and Glade Draw. If the private surface owner desires, the BLM will prohibit surface disturbance on the following Oregon Trail sites: Oregon Trail Monument, Knob Hill, La Prele Station, Parker and Ringo Graves, Battle of Red Buttes, and Poison Spring. Installation of interpretive facilities also is covered by this decision. Surface development is not permitted on certain parcels along the Bozeman Trail in Converse County (Appendix W). Each trail segment was evaluated according to *Guidelines for the Evaluation of Historical Wagon Trails of the Casper District and Wyoming State Office*. Trail segments are protected until their significance is evaluated. Surface disturbance will be prohibited within either ¼ mile or the visual horizon (whichever is closer) of historic trails. Although not specifically mentioned, management of the Bridger Trail falls under this decision.

Management actions for NHTs generally address managing trails for long-term heritage and educational values, reducing imminent threats from natural or human-caused deterioration, and reduction conflicts with other resource uses. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.7.4 Wild and Scenic Rivers

Currently, no WSRs nor congressionally designated study rivers exist within the planning area. In an effort to ensure that no potentially eligible rivers were inadvertently missed, the BLM initiated a WSR review of all BLM-administered public lands along waterways within the Casper RMP planning area. The review, completed in December 2002, was done to determine if any of these public lands meet WSR eligibility criteria and suitability factors, as identified in the Wild and Scenic Rivers Act of 1968, as amended.

Step I – Eligibility Criteria

A total of 162 waterways were assessed. Applicable source lists, such as the NPS Nationwide Rivers Inventory and the American Rivers Outstanding Rivers List also were consulted. Following the inventory, resource specialists assessed each waterway under the eligibility criteria of free-flowing and possessing one or more outstandingly remarkable values. Of the 162 waterways reviewed in the planning area, 156 were found to have no outstandingly remarkable values and were dropped from further consideration, while six were determined to meet the WSR eligibility criteria. Two of these six waterway review segments actually include the main waterway segment and one or more tributaries that together were reviewed as "waterway units." They are Badwater Creek, and Buffalo Creek (upper and lower) units. The six waterways involving public lands determined to meet the eligibility criteria are below:

- Buffalo Creek (lower section)
- Buffalo Creek (upper section)
- Badwater Creek
- Deer Creek
- E.K. Creek
- North Platte River.

While the public lands along the two sections of Buffalo Creek (upper and lower) are along the same waterway, they are treated as separate waterway review segments due to their distance from each other and their unique characteristics. Table 3-32 details the six waterway segments moving forward for additional study.

Table 3-32. Casper Planning Area – List of Eligible Waterways

Waterway Reviewed	Segment	Free Flowing	Outstandingly Remarkable Values on Public Lands	Eligible
Badwater Creek (includes Badwater, Valdez, Pommel creeks, and Mine Draw)	T.39N., R.88W: NE1/4 of Section 1 to SE1/4 of Section 11	Yes	Scenic, Recreational	Yes
North Platte River	T.32N., R.81W: Center of Section 3	Yes	Historical	Yes
Buffalo Creek (lower section)	T.41N., R.84W: NE1/4 Section 33 to NW1/4 Section 34	Yes	Scenic, Recreational, Cultural, Historical	Yes
Buffalo Creek (includes the upper section of Buffalo Creek and Pine Creek)	T.40N., R.86W: SW1/4 Section 23 to T.40N., R.85W: SW1/4 Section 28	Yes	Scenic, Recreational, Cultural, Historical	Yes
EK Creek	T.38., R.87W: SW1/4 Section 7 to T.38N., R.88W: Section N1/2 Section 24	Yes	Cultural	Yes
Deer Creek	T.31N., R.77W: SE1/4 Section 11 to NE1/4 Section 2	Yes	Scenic	Yes

Step II – Suitability Factors

All the waterway segments within the planning area found to meet the eligibility criteria are tentatively classified as wild, scenic, or recreational. The segments were further reviewed to determine if they meet WSR suitability factors. All six waterways were screened in 2002. None of the six met the suitability factors. Tentatively, they have been recommended to be dropped from further consideration, pending public review through the RMP process.

The factors that caused the review team to arrive at a non-suitable determination follow:

> Factor 1 – Characteristics that do not make the public lands involved a worthy addition to the NWSRS
>
> Factor 2 – Current status of landownership (including mineral ownership) and land and resource uses in the area, including the amount of private land involved, and any associated or incompatible land uses
>
> Factor 6 – Ability of the BLM to manage and (or) protect the public lands involved as part of the NWSRS, or by other mechanism (existing and potential) to protect identified values other than by WSR designation.

Eligible waterways identified for further study through BLM planning processes are protected under BLM's discretionary authority. Existing uses occurring at the time of the evaluation may continue in the same manner and degree on rivers determined eligible for further study. New uses or changes in use will be assessed on a case-by-case basis in an environmental analysis to determine whether the identified waterway values, the free flow, or the tentative classification could be degraded with new or changed use.

3.8 Socioeconomic Resources

The Socioeconomic Resources topic includes the individual resources of social conditions, economic conditions, health and safety, environmental justice, and tribal treaty rights. Each individual resource section provides a definition and description of the resource and the current condition of the resource. Management challenges and actions are presented as appropriate for each resource.

3.8.1 Social Conditions

Social conditions concern the human communities in the planning area, including towns, cities, and rural areas, and the custom, culture, and history of the area as it relates to human settlement, as well as current social values. BLM management actions can affect social conditions in the planning area and in nearby communities. This section provides a summary of demographic information and custom and culture, including trends and current conditions. Social conditions often are based on a wide range of community and demographic characteristics and involve broad topics of community interests. Other discussions related to social conditions are provided in the Economic Conditions and Environmental Justice sections of this document.

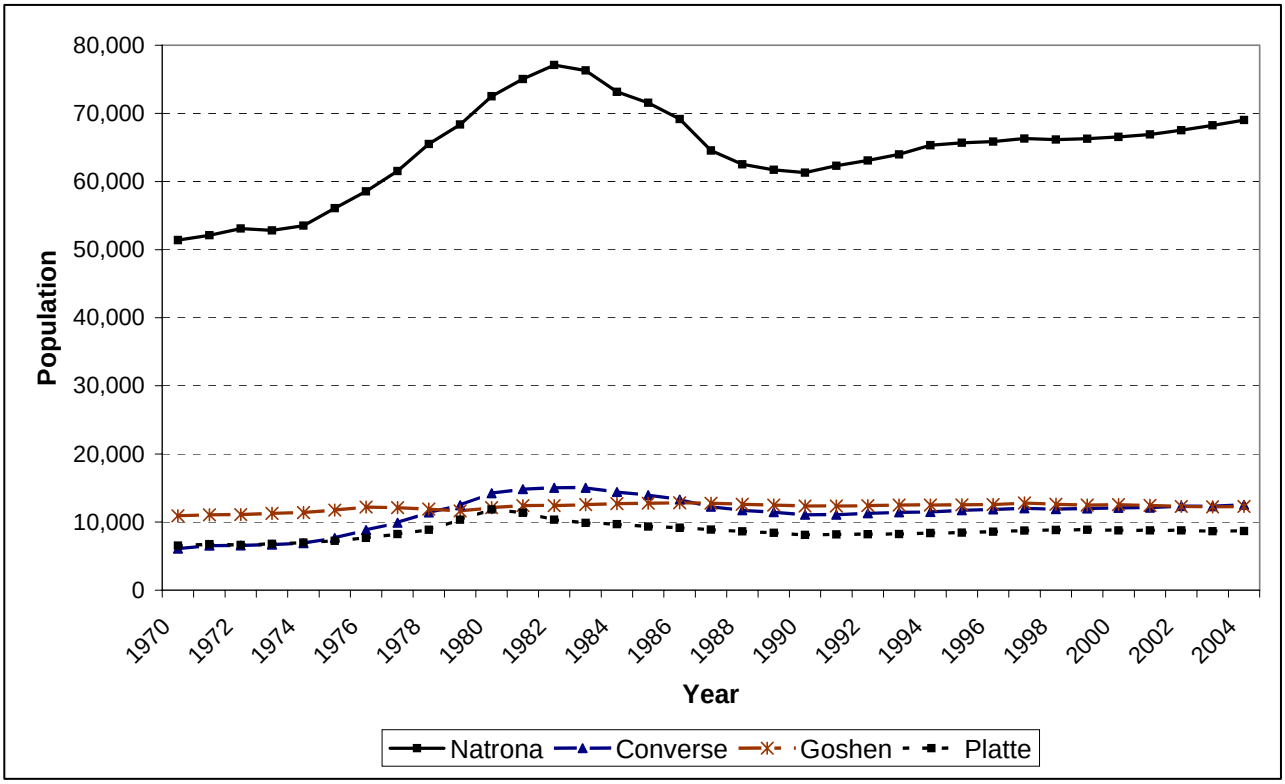
Population and Demographics

The four counties in the planning area are Natrona, Converse, Platte, and Goshen. As of 2004, Natrona was the most populous, with 69,010 people. Converse County had 12,515 people, Platte had 8,666 people, and Goshen had 12,286 people. Since 1970, the population has grown slowly and steadily in Goshen County. The remaining counties experienced rising population in the late 1970s into the early 1980s, a decline in population at some point in the 1980s, and slow growth since about 1990, with overall growth positive from 1970 to 2004 (BEA 2005; U.S. Census Bureau 2005c). Figure 3-9 provides a visual summary of population trends by county from 1970 to 2004.

As of 2004, the largest city in the planning region is Casper, with 51,240 persons (U.S. Census Bureau 2005a). Casper is the county seat of Natrona County. Other relatively large cities and towns include Torrington (5,560 people), the county seat of Goshen County; Douglas (5,489 people), the county seat of Converse; Wheatland (3,500 people), the county seat of Platte County; Mills (2,875 people) and Evansville (2,306 people), just outside Casper; and Glenrock (2,300 people), in Converse County (U.S. Census Bureau 2005a). Although there are several other incorporated towns within the planning area, a substantial proportion of the population lives outside incorporated places. For instance, nearly 11,000 people in Natrona County, or about 16 percent of the county's population, lived outside incorporated areas in 2004. The proportions for the other counties in the planning area are greater: 34 percent of the people in Converse County, 40 percent of the people in Platte County, and 44 percent of those in Goshen County lived outside incorporated places in 2004 (U.S. Census Bureau 2005c). This population pattern contributes to the largely rural character of the planning area.

Because boom and bust cycles can affect the demand for housing, it is important to know the supply of housing in the planning area. Natrona County had 29,882 housing units in 2000, of which just more than 3,000, or about 10 percent, were vacant in April 2000 (Sonoran Institute 2003c). Converse County had 5,669 housing units in 2000, of which about 1,000, or about 17 percent, were vacant in 2000 (Sonoran Institute 2003a). Goshen County had a vacancy rate of 14 percent in 2000, with 820 of the 5,881 housing units vacant, and Platte County had a 20 percent vacancy rate, with 903 vacant housing units out of 4,528 (Sonoran Institute 2003b; Sonoran Institute 2003d).

Figure 3-9. Population Trends in Natrona, Converse, Goshen, and Platte Counties, Wyoming, from 1970 to 2004



Sources: BEA 2005; U.S. Census Bureau 2005c

Although more recent vacancy data are not available at the county level, 2004 data on housing units show an increase of 1.5 to 1.8 percent in Platte, Goshen, and Natrona counties, and an increase of 2.8 percent in Converse County, compared to the year 2000. Thus, in 2004, Natrona County had 30,433 housing units, Converse County had 5,830 units, Platte County had 4,598 units, and Goshen County had 5,972 units (U.S. Census Bureau 2005b).

BLM administers 37 percent of the total area of Natrona County (approximately 1.1-million acres of the total 3.0-million acres) and 5 percent of Converse County (approximately 130,000 of the 2.7-million acres), but administers only 6 percent of Platte County's land (82,000 of the 1.35-million acres), and only 2 percent of Goshen County (25,000 of the 1.4-million acres). However, BLM also administers the subsurface mineral estate in all four counties of the socioeconomic study area. Thus, BLM's management decisions have the potential to affect social conditions in all four counties. However, with respect to social conditions related to ranching, BLM's decisions have more potential to affect conditions in Natrona and Converse counties than in Goshen or Platte counties.

Custom, Culture, and Social Trends

Understanding the social development, culture, and history of an area provides valuable insight into how changes to the planning area might affect the livelihood and quality of life of residents. The planning area is predominantly rural in character and the economy is based primarily on resource development (e.g., mining, agriculture) and services (e.g., retail trade). However, some areas, particularly Casper, have a more diversified economic base.

Ranching has been and remains an important part of the history, culture, and economy of the planning area. However, there are increasing challenges that face ranchers, including changes in federal regulations, economic issues, and land uses and development patterns that can impact the viability of ranching in some locations. Ranchers and livestock permittees face pressure as they compete with demands from other users of public lands. Socially and economically, the agriculture industry is important to local communities. The livestock industry provides direct and indirect employment, maintenance of scenic vistas, active stewardship of remote lands, wildlife habitats, and the continuation of a way of life that helps draw tourists to the state.

The availability of a wide spectrum of recreation opportunities on public lands is another important component of many lifestyles and communities in the planning area. Recreation involves diverse groups with some activities that are compatible and others that are incompatible with one another. Changes in management of public lands can affect the various recreation sectors differently.

Finally, resource development and resource protection are community values within the planning area. Seeking an appropriate balance between these often competing values is central to BLM's mission and the RMP process. Some individuals and groups give a high priority to resource protection, while others give a high priority to resource development.

Each of the views described in the previous discussions are central to both broad and focused social issues within the planning area because they relate strongly to issues of community growth, economic development, and quality of life within the planning area. The following discussion presents more specific county-by-county information on custom, culture, and social trends.

Natrona County, particularly the county seat of Casper, has been an important center of commerce since the mid-nineteenth century. Casper began as a ferry crossing in 1847; soon after, a military fort was built to protect the Platte Bridge. With the discovery of the Salt Creek oil field in the 1880s and the Teapot Dome oil field a few decades later, oil and gas drilling came to dominate Casper's economy. Ranching also has been a historically important base for the county's economy. Today, Casper serves as a service center for the oil and gas industry, as well as a center for coal mining, uranium, and medical and financial services. In 2000, about 87 percent of the population lived in urban areas, as defined by the U.S. Census (U.S. Census Bureau 2002), and in 2004, about 85 percent of the population lived in incorporated places (U.S. Census Bureau 2005c). Note that some incorporated places are classified as rural; thus, these two statistics do not necessarily imply that the county is becoming more rural over time.

Converse County is more rural than Natrona County, with just 44 percent of the population living in urban areas according to the 2000 U.S. Census (U.S. Census Bureau 2002), and 66 percent of the population living in incorporated places in 2004 (U.S. Census Bureau 2005c). The economic base in Converse County includes agriculture, as well as mining of oil, gas, and solid minerals. Converse has the only producing coal mine in the planning area, located in the southern tip of the highly productive Powder River Basin, and the largest active uranium mine in Wyoming. Along with much of the state, Converse County experienced an economic boom in the late 1970s as national energy prices soared followed by a decline in the mid-1980s as they fell.

Platte County's overall population has decreased since about 1980. In 1980, the county population was 11,855, with a decrease to 8,113 in 1990; population remained relatively stable over the next 10 years (with a population of 8,757 in 2000 and 8,666 in 2004) (BEA 2005; U.S. Census Bureau 2005c). The overall percent change in population from 1980 to 2004 was down 26.9 percent. The economic base is primarily agricultural. Mining plays a relatively minor role in the county's economy, and the population is predominantly rural. According to the U.S. Census, 60 percent of residents lived in rural areas in 2000

(U.S. Census Bureau 2002); however, the majority of the population (60 percent) lived in incorporated places in 2004 (U.S. Census Bureau 2005c).

Goshen County's population has remained relatively stable over the past 20 years, partly because its economy is primarily rooted in agriculture. Because its climate is relatively mild, Goshen is a highly productive agricultural center. Goshen County leads the state in cattle inventories (as of January 2003), and in 2003, the county produced more dry beans and corn grain than any other county in Wyoming, ranking second in terms of winter wheat, oats, and hay production (Wyoming Agricultural Statistics Service 2004b). In 2000, 45 percent of the population was rural, according to the U.S. Census (U.S. Census Bureau 2002). As in the other counties, a majority of the population (56 percent) lived in incorporated places in 2004 (U.S. Census Bureau 2005c).

3.8.2 Economic Conditions

Economic analysis is concerned with the production, distribution, and consumption of goods and services. Economic conditions describe how individuals and communities participate in the exchange of goods and services by earning a living and consuming products and services they need and want. The BLM has the capacity, through its decisionmaking responsibilities, to manage resource development in the planning area and thereby influence the economy of the wider region. This section provides a summary of demographic and economic information, including trends and current conditions. It also identifies and describes major economic sectors in the planning area that can be affected by BLM management actions.

Economic Activity and Output

Industries most affected by BLM land management policies and programs in the planning area are mining (including oil and gas), travel, tourism and recreation, and agriculture. Some harvesting of forest products occurs in the planning area, but at present, the harvest meets local demands only; there is no known regional or national demand for forest products from public lands in the planning area (see the Vegetation – Forests, Woodlands, and Forest Products section).

Mining, Including Oil and Gas

Mining and mineral production in the planning area constitutes the majority of economic activity in the planning area. Table 3-33 provides a summary of the quantity and value of mining production in the counties in the planning area, and for the state as a whole. Economically, the largest contributors to mining activity are oil and gas in Converse and Natrona counties and coal and uranium mining in Converse County. The Mineral Resources section of this document contains additional information about mineral resources in the planning area.

Recreation

Recreation contributes to the region's economy. In 2003, the WGFD found that direct expenditures from hunting, fishing, and wildlife watching in the counties in the planning area totaled $50.7 million (WGFD 2003). About $8.4 million of these expenditures were attributable to those activities on surface area managed by the BLM in the planning area (WGFD 2003). Direct expenditures include visitor spending on lodging, food and groceries, gasoline, motor vehicle repairs and service, outfitters and guides, access fees, entertainment, souvenirs, equipment, and other categories.

Table 3-33. Estimated Mineral Production and Value by County in the Casper Planning Area

Mineral	Natrona	Converse	Platte	Goshen	Wyoming
Production or Sales (units)					
Oil (bbls sold)*	2,920,191	1,863,333	0	0	50,167,571
Gas (mcf sold)	36,246,542	20,683,423	0	0	1,646,021,746
Coal (tons)	0	26,982,654	0	0	376,784,702
Uranium (lbs produced)	0	1,201,376	0	0	1,225,077
Sand and Gravel (tons)	539,519	602,889	727,924	30,292	10,301,766
Limestone (tons)	0	0	55,552	0	792,696
Bentonite (tons)	38,429	0	0	0	3,629,010
Decorative Stone (tons)	75	0	68,408	0	68,483
Leonardite (tons)	0	32,366	0	0	32,336
Taxable Valuation ($ millions)					
Oil	$78	$52	$0	$0	$1,244
Gas	$138	$75	$0	$0	$5,265
Coal	$0	$119	$0	$0	$1,847
Uranium	$0	$8	$0	$0	$8
Sand and Gravel	$0.8	$0.7	$1.0	$0.02	$13
Limestone	$0	$0	$0.1	$0	$1.1
Bentonite	$0.2	$0	$0	$0	$33.4
Decorative Stone	$0.01	$0	$1.36	$0	$1.36
Leonardite	$0	$0.3	$0	$0	$0.3

Source: Production and valuation are for July 1, 2003, through June 30, 2004, from Wyoming DOR (2005).

Notes: Taxable valuation may differ from market or sales value because it excludes certain costs of production. This table includes all minerals for which the Wyoming DOR (2005) provides data on production from the counties in the planning area.

*Includes stripper oil
bbl barrel
DOR Wyoming Department of Revenue
lb pound
mcf thousand cubic feet

Livestock Grazing

The Casper Field Office manages lands for livestock grazing in Converse, Goshen, Natrona, and Platte counties. Approximately 1.4-million surface acres of public land is available for grazing within 514 grazing allotments. Actual grazing use is about 182,789 AUMs (Fifield 2004). The majority of grazing leases are only for cattle (BLM 2005c).

Grazing allotments occur throughout the planning area, with the majority in Natrona County and western Converse County (BLM 2005c). BLM-administered lands are important to local ranch operations, particularly in Natrona and western Converse counties. In these counties, the majority of ranch operations lease some public lands, and many are dependent on these lands to keep their operations running (BLM 2005c). BLM-administered grazing allotments are leased at lower fees on average than state or private lands: federal grazing fees in Wyoming were $1.35 per AUM in 2003 and $1.43 per AUM in 2004 (BLM 2005i). For comparison, grazing fees on state land were $4.04 per AUM in 2003 and

$4.13 per AUM in 2004 (Thorson 2004). The average grazing rate on privately owned, nonirrigated land was $13.40 per AUM in 2003 (Wyoming Agricultural Statistics Service 2004b).

However, it should be noted that it has been argued the lower lease fees correspond to potentially greater use restrictions and responsibilities for the lessee. For instance, federal grazing leases typically restrict the number and species of animals that may be grazed, while on private leases there is normally no penalty for grazing more animals than agreed upon. However, if running more animals on a private lease results in overgrazing, the landowner may not be willing to renew the lease (Fifield 2006). Federal leases also tend to be less flexible than private leases with respect to adjusting turnout and roundup dates, although currently the season of use for most leases authorized by the Casper Field Office is year-round (March 1 to February 28) (Fifield 2006). This does not mean, however, that in the future the BLM will not put specific stipulations on leases if rangeland health evaluations indicate changes in current grazing management are needed (Fifield 2006). There are also differences in terms of construction and maintenance of rangeland improvements, such as fences and water facilities, although a perfect comparison is not possible because there are different specifications that vary for specific private leases. On federal leases, construction of improvements can be done in a variety of ways, and expenses other than materials may be the responsibility of the lessee; the lessee is also generally responsible for maintaining the improvements. On private leases, the landowner typically bears a substantial part of the cost of major range improvements, as well as pays for revegetation, but on many private leases in the planning area, the lessee is responsible for maintaining facilities (Fifield 2006). State leases tend to be intermediate between federal and private leases in terms of use restrictions; on state lands in the planning area, the lessee is generally responsible to construct and maintain improvements (Fifield 2006). Although historically, most of the higher quality lands were homesteaded, leaving less productive lands in federal ownership, in many allotments in the planning area, particularly in upland areas, there is no difference in productivity between the private and state lands and federal lands (Fifield 2006).

In addition to administering federal grazing lands, the BLM provides for two SDWs in the planning area, both used by about 30 leaseholders to drive their cattle between summer and winter ranges. In the absence of the SDWs, ranchers would use trucks to transport their livestock between ranges on a seasonal basis, incurring additional costs.

The number of farms and ranches statewide increased slightly from the late 1980s to the early 1990s and has remained at 9,200 from 1992 to 2002. Land in farms and ranches also has been constant from 1992 to 2002, at 34.6-million acres (Wyoming Agricultural Statistics Service 2004a). In the counties in the planning area, farm numbers and areas have increased between 1992 and 2002, from 1,734 operations on 7.5-million acres in 1992, to 1,846 operations on nearly 8.0-million acres in 2002 (USDA 2004; USDA 1999). Cattle inventories in the counties in the planning area increased steadily from 1997 to 2001, declined in 2002 and 2003, and rose again in 2004; overall, the number has increased from 342,000 in 1997 to 355,000 in 2004. Breeding sheep inventories have declined steadily, from 130,000 in 1997 to 84,400 in 2004 (Wyoming Agricultural Statistics Service 2004a). A 1991 study by economists at the University of Wyoming shows that agriculture is an important source of export income for the state's economy, since many agricultural products produced within the state are sold outside the state. The study also shows that the great majority of inputs to agricultural production come from within the state, and that profits and other income from agricultural production tend to stay within the state. Taken together, these findings indicate that agricultural production is an important contributor to the state's economy (Moline et al. 1991). In a 2000 study, economists at the University of Wyoming compared the income provided to county governments and public schools to the financial demands on community services by agricultural and residential developments. The study shows that on average in Wyoming, ranching activity generates nearly twice as much income for community services as it requires in expenditures on community services, whereas residential development generates about half as much income as it requires in

expenditures (Taylor and Coupal 2000). These findings underscore the importance of agricultural production in terms of its contribution to local economies.

Personal Income

Per capita personal income in 2003 was greatest in Natrona County; residents of Natrona County had an average income of $35,599, including wages, salaries, and income from investments and rent, and transfer payments such as social security. Per capita personal income was $29,566 in Converse County, $27,609 in Platte County, and $25,786 in Goshen County; the state average was $32,433. From 1990 to 2003, per capita personal income grew in real terms (i.e., accounting for inflation) in all four counties; the gain was largest in Converse County (32 percent) and was about equal in the other counties (18 percent in Platte County, 16 percent in Natrona County, and 15 percent in Goshen County) (BEA 2005; BLS 2005a).

Table 3-34 provides a summary of the sources of personal income by county. The largest component of personal income in all four counties in 2000 was nonlabor income, including transfer payments (e.g., retirement, disability, insurance payments, Medicare, and welfare), as well as dividends, interest, and rent. Dividends, interest, and rent made up between 58 percent and 68 percent of nonlabor income in all four counties. Income from the services and professional sector was the largest contributor to labor-derived personal income in all four counties; the government sector was among the top three contributors to labor-derived personal income in all counties (Sonoran Institute 2003a; Sonoran Institute 2003b; Sonoran Institute 2003c; Sonoran Institute 2003d).[1]

Table 3-34. Personal Income by Source of Income in Natrona, Converse, Platte, and Goshen Counties, Wyoming, for the Year 2000 (percentage of total)

Source	Personal Income[1]			
	Natrona	Converse	Platte	Goshen
Farming, Ranching, and Agricultural Services	0.4	3.1	5.2	14.5
Mining (including oil and gas)	19.6	12.9	0.7	0.5
Manufacturing (including forest products)	2.7	1.5	1.3	3.4
Services and Professional	32.5	28.0	40.6	23.7
Construction	3.9	4.9	7.1	2.8
Government	9.0	12.9	11.2	11.4
Non-Labor Income[2]	34.7	38.5	43.2	41.7
Total Personal Income ($ millions) (2000)	$2,137	$283	$210	$288
Total Personal Income ($ millions) (2003)	$2,429	$364	$239	$315

Sources: Sonoran Institute (Sonoran Institute 2003a; Sonoran Institute 2003b; Sonoran Institute 2003c; Sonoran Institute 2003d); BEA 2005

[1]Percentages may not add to 100 percent because of adjustments made for place of residence and personal contributions for social insurance.

[2]Nonlabor income includes transfer payments (retirement, disability, insurance, Medicare, welfare), as well as dividends, interest, and rent.

[1]Although more recent data are available for some sectors, there are several sectors for which data are not available due to confidentiality requirements. (The Sonoran Institute, which provided the data summarized in Table 3-34, estimates earnings in some sectors where confidentiality limits data availability; however, the most recent data available with these estimates are from 2000.) Data that are available for 2003 from the Bureau of Economic Analysis suggest the income breakout by sector was similar in 2003 to the breakout in 2000; one notable difference is the percentage of income from mining earnings dropped to 14.0 percent in Natrona County and rose to 17.4 percent in Converse County (BEA 2005).

The table shows that in terms of income, mining is an important sector in Natrona and Converse counties. Mining is responsible for nearly 20 percent of personal income in Natrona County and about 13 percent of personal income in Converse County. The farming, ranching, and agricultural services sector is particularly important in Goshen County, accounting for nearly 15 percent of personal income in that county. Farming and ranching also is an important contributor to personal income in Converse and Platte counties. The majority (77 percent) of farming and ranching income in Goshen County is from livestock and livestock products, while about 14 percent is from crops (the remainder is from government payments, rent, and in-kind income, such as food grown on the farm). Livestock and livestock products also comprise 77 percent of farming and ranching income in Platte County, where just more than 5 percent of personal income derives from farming and agricultural services. About 12 percent of farming and ranching income in Platte County derives from crops (Sonoran Institute 2003a; Sonoran Institute 2003b; Sonoran Institute 2003c; Sonoran Institute 2003d).

The Census County Business Patterns (U.S. Census Bureau 2005a) provides additional data on mining related earnings and employment. Table 3-35 provides a summary of mining-related earnings and employment for Converse and Natrona Counties from this source.

Table 3-35 shows that for Natrona County, oil and gas extraction, oil and gas well drilling, and oil and gas operations support are the largest contributors to employment and earnings. Together, these oil and gas-related activities contribute at least 911 of the 1,208 jobs (75 percent) (note that the data do not reveal exactly how many jobs are in oil and gas well drilling). Mining other than oil and gas, including coal, metal ore, and nonmetallic mineral (e.g., sand and gravel) mining, contributes about 4 percent of the jobs and payroll for mining activities in Natrona County. For Converse County, mining other than oil and gas, led by coal mining, is the largest contributor to mining sector employment and earnings. However, the table also shows that oil and gas operations support activities that contribute substantially to mining employment in Converse County, with between 100 and 249 of the 636 total mining jobs attributable to oil and gas operations support. Oil and gas extraction alone is a small but important contributor, as it provides for 36 of the 636 mining jobs (about 6 percent) and $1.2 million of the $36 million in earnings (about 3 percent).

Employment

The breakout of employment by industry shows a pattern similar to that of the personal income statistics, highlighting the importance of the mining industry, as well as the farming, ranching, and agricultural services industry. Table 3-36 provides a summary of total employment by sector for the four counties in the planning area. Again, note that the data in the table are from 2000; although more recent (2003) data are available, employment figures for 2003 are not available for many sectors due to nondisclosure requirements. However, a comparison of data available for 2003 suggest the breakout of employment by industry is generally similar in 2003 to 2000. Although the Sonoran Institute profiles do not contain data on the oil and gas sector broken out from other mining sectors, data on employment for a finer breakout of the mining sector are shown in Table 3-35.

Table 3-35. Earnings and Employment for Mining Activities in Natrona and Converse Counties, Wyoming, for 2002

Source	Natrona		Converse	
	Payroll ($)[1]	Employees	Payroll ($)	Employees
Mining	$55,525,000	1,208	$36,250,000	636
Oil and Gas Extraction	$13,204,000	249	$1,221,000	36
Mining (Except Oil and Gas)	$2,440,000	52	$29,988,000	450
Coal Mining	N/A[2]	N/A[2]	N/A[2]	250-499
Metal Ore Mining	N/A[2]	0-19	N/A[2]	100-249
Nonmetallic Mineral Mining and Quarrying	N/A[2]	20-99	N/A[2]	0-19
Mining Support Activities	$39,881,000	907	$5,041,000	150
Drilling Oil and Gas Wells	N/A[2]	250-499	N/A[2]	0-19
Oil and Gas Operations Support Activities	$20,553,000	412	N/A[2]	100-249
Support Activities for Coal Mining	N/A[2]	0-19	N/A[2]	N/A[2]
Support Activities for Metal Mining	N/A[2]	0-19	N/A[2]	N/A[2]
Nonmetallic Minerals Support Activity (Except Fuels)	N/A[2]	0-19	N/A[2]	0-19

Sources: U.S. Census Bureau 2005a. Number of employees is for week ending March 12, 2002. Payroll data are for the entire year.

[1]For some sectors and subsectors, the data source reveals only a range for the payroll and number of employees so as not to disclose confidential business information (there are very few employers in the sector).

[2]The data source does not reveal data on payrolls for this subsector due to confidentiality requirements (there are relatively few employers in the sector).

N/A Not Applicable

Table 3-36. Employment by Industry in Natrona, Converse, Platte, and Goshen Counties, Wyoming, for the year 2000 (Percentage of Total)

Industry	Natrona	Converse	Platte	Goshen
Farming, Ranching, and Agricultural Services	2.4	8.5	14.1	14.6
Mining	6.8	10.7	1.1	1.4
Manufacturing (including forest products)	4.0	2.8	2.4	5.1
Services and Professional	67.6	52.4	59.7	55.3
Construction	6.4	7.0	8.2	5.6
Government	12.7	18.5	14.5	18.0
Total Employment (2000)	44,858	7,092	5,810	7,026
Total Employment (2003)	46,609	7,001	5,651	6,884

Sources: Sonoran Institute (Sonoran Institute 2003a; Sonoran Institute 2003b; Sonoran Institute 2003c; Sonoran Institute 2003d); BEA 2005 (Total Employment in 2003).

Note: Percentages may not add up to 100 percent due to rounding.

Average earnings per job in 2003 were lower than the national average in all four counties, and were lower than the state average in Platte and Goshen counties. However, average earnings per job in Natrona County were higher than the state average. Table 3-37 shows the average earnings per job by county.

Table 3-37. 2003 Average Earnings Per Job by County

Locality	Average Earnings Per Job
Natrona County	$38,626
Converse County	$34,337
Platte County	$28,408
Goshen County	$26,711
Wyoming	$34,072
United States	$42,553

Source: BEA 2005 (Table CA30).

All four counties in the planning area had lower unemployment in 2004 than the national average of 5.5 percent. Natrona County had an unemployment rate of 3.7 percent, Converse County had a rate of 4.0 percent, Platte County had a rate of 5.1 percent, and Goshen County had 4.3 percent unemployment. Wyoming had 3.9 percent unemployment overall in 2004 (BLS 2005b; BLS 2005c).

Tax Revenues

Economic activities on BLM-administered land and mineral estate contribute to the fiscal well-being of local governments, as well as to state and federal governments. BLM management actions have the potential to affect tax revenues from the mining sector; the travel, tourism, and recreation sector; and the livestock grazing and ranching sector.

Mining, Including Oil and Gas (Tax Revenues)

The mining industry contributes substantially to state and local tax revenues. For example, a 2003 study by the Wyoming Legislative Service Office (WLSO 2003) indicated that mineral severance taxes have constituted about 20 percent of the state general fund revenue since 1981 and about 24 percent for 2003 to 2004. The same study reported that the mining sector paid about $806 million in state and local tax revenues in fiscal year 2002. This represents 54 percent of total state and local tax revenues from major tax sources (severance, *ad valorem*, sales and use, cigarette, gross receipts, liquor, and franchise taxes) (WLSO 2003). Wyoming has no personal or corporate income tax.

Oil and gas production on federal lands in Wyoming is subject to state, federal, and local taxes, as described below. *Ad valorem* production and production equipment taxes are payable to the county where the production occurs, and are, therefore, most important for Converse and Natrona counties, since that is the focus of oil and gas production in the planning area.

State severance taxes are levied on current production at the rate of 6 percent of the taxable value of crude oil and natural gas. The taxable value is defined as the gross sales value minus certain allowable costs for royalties, transportation, and natural gas processing. Rates are lower for less-productive stripper wells (Wyoming DOR 2001b). Estimated state severance tax collections for minerals produced in the counties in the planning area are shown below.

Local *ad valorem* production taxes are levied on sales of oil and gas. *Ad valorem* production tax rates vary by county and within counties. In 2004, average tax rates on mineral production were about 5.9 percent in Converse County, 6.7 percent in Natrona County, 6.8 percent in Goshen County, and 7.0 percent in Platte County (Wyoming DOR 2005). Based on these tax rates and the total taxable value of mineral production, it is possible to estimate *ad valorem* production tax assessments in the counties. According to Wyoming Department of Revenue (Wyoming DOR 2005), total taxable value of mineral

production in production year 2003 was $217 million in Natrona County, $255 million in Converse County, $2.5 million in Platte County, and $22,000 in Goshen County. Based on the average *ad valorem* mineral-production tax rates in 2004, estimated tax assessments is $14.6 million in Natrona County, $14.9 million in Converse County, $0.2 million in Platte County, and about $1,500 in Goshen County. The relative importance of different minerals in the counties in contributing to these tax assessments is illustrated by the data in Table 3-33, which shows taxable valuation for the different minerals within the counties.

Local *ad valorem* property taxes are levied on the taxable valuation of oil and gas equipment. Rates are the same as those for *ad valorem* production, but the taxable valuation of oil and gas equipment is 11.5 percent of the assessed value (Grenvik 2005; Wyoming DOR 2001a). Data on the taxable valuation or tax assessments on oil and gas equipment are not readily available.

Federal mineral royalties are levied at 12.5 percent of the value of current oil and gas and coal production, after allowable deductions. Half the royalties collected are returned to Wyoming and a portion of the royalties received by the state are disbursed to cities and towns (State of Wyoming 2004). According to the Wyoming Consensus Revenue Estimating Group, federal mineral royalties for production in the state were $554 million in Fiscal Year 2004 and $846 million in fiscal year 2005 (CREG 2006). This includes royalties from oil, gas and gas plant products, and coal, including coal lease bonuses.

State and local taxes, including the *ad valorem* property tax, also apply for coal and uranium mining. In past years, uranium producers have not paid state severance taxes due to tax exemptions that are conditional on the market price for uranium (Wyoming DOR 2004). However, recent increases in demand for uranium have pushed the market price higher than the limit for the tax exemptions. Although some coal production has been exempt from severance taxes due to similar exemptions, producers in the Powder River Basin, which includes the production from Converse County, have paid severance taxes (Wyoming DOR 2004).

Using the data from Table 3-33, along with state severance tax rates, it is possible to estimate state severance tax collections for each county for the different mineral products. Table 3-38 shows estimated state severance tax collections for the counties for production between July 1, 2003, and June 30, 2004.

As the table shows, state severance taxes based on production within the counties in the planning area were greatest in Natrona and Converse counties, which is consistent with the importance of mining for employment and earnings in these counties. Natural oil and gas were the largest contributors to state severance taxes within Natrona County, while coal, natural gas, and oil were the largest contributors to state severance taxes in Converse County. Other minerals contributed to state severance taxes within all four counties.

Travel, Tourism, and Recreation (Tax Revenues)

BLM management actions also affect travel and tourism, both directly (through decisions that affect recreation access) and indirectly (e.g., through decisions that affect wildlife populations). The State Office of Travel and Tourism estimates that in 2003, travel and tourism accounted for $88 million in tax revenues, including $54 million in state revenues and $34 million in local revenues, not including property tax collections related to recreation infrastructure (Wyoming State Office of Travel and Tourism 2004). Most of these revenues are due to tourism for pleasure; the Office of Travel and Tourism estimated that 90 percent of visitors to Wyoming came for pleasure, while 10 percent came for business (Wyoming State Office of Travel and Tourism 2004). Table 3-39 shows tax receipts for the counties in the planning area.

Table 3-38. Estimated State Severance Tax Collections in Natrona, Converse, Platte, and Goshen Counties, Wyoming, Production Year 2003

Mineral	Natrona	Converse	Platte	Goshen
Crude Oil	$1,084,668	$1,479,997	$0	$0
Stripper Oil	$2,394,146	$1,074,082	$0	$0
Natural Gas	$8,263,575	$4,502,353	$0	$0
Coal	$0	$8,357,456	$0	$0
Uranium[1]	$0	$0	$0	$0
Sand and Gravel	$15,749	$13,328	$20,003	$433
Limestone	$0	$0	$2,719	$0
Bentonite	$4,548	$0	$0	$0
Decorative Stone	$130	$0	$27,135	$0
Leonardite	$0	$5,502	$0	$0
Total	$11,762,818	$15,432,718	$49,857	$433

Source: Wyoming DOR 2005

Note: State severance tax rates are 6 percent of taxable valuation for crude oil and natural gas, 4 percent for stripper oil, 7 percent for coal, and 2 percent for all other minerals shown.

[1]Wyoming DOR (2005) notes that uranium production was exempt from severance taxes during this period in accordance with Wyoming Statutes 39-14-505, as amended in 2003 (due to low market prices). Note that current uranium market prices are higher than the levels in Production Year 2003, and current production is subject to severance taxes.

Table 3-39. Local and State Tax Receipts Due to Travel and Tourism in Wyoming, 2003

Locality	Local Tax Receipts[1]	State Tax Receipts[1]
Converse County	$390	$733
Goshen County	$238	$627
Natrona County	$2,480	$4,941
Platte County	$430	$900
State of Wyoming	$34,000	$53,600

Source: Wyoming State Office of Travel and Tourism 2004.
[1]in thousands

Livestock Grazing and Ranching (Tax Revenues)

Livestock grazing and ranching, and agriculture, more generally, contribute directly to local and state tax revenues from local *ad valorem* property taxes and local and state sales and use taxes. According to a 2003 report on state and local tax revenues, agriculture, forestry, fishing, and hunting brought in $9.2 million in state and local tax revenues due to *ad valorem* property taxes, and $1.4 million due to sales and use taxes, for a total of more than $10.6 million (WLSO 2003).

3.8.3 Health and Safety

The BLM's Hazard Management and Resource Restoration Program addresses a variety of hazards on public surface to reduce risks to visitors and employees. Hazards may include hazardous materials; mine shafts and adits; abandoned equipments and structures; explosives and munitions; and spills from pipelines, tankers, and storage tanks.

Activities directed toward health and safety concerns in the planning area primarily encompass the following:

- Abandoned mine lands (AMLs)
- Formerly used defense sites (FUDS)
- Hazardous wastes and materials.

Abandoned Mine Lands

Currently, 20 known AML sites are in the planning area (Wyoming DEQ, AML Division). These sites include sand, gravel, bentonite, uranium, gold, and miscellaneous mineral mining sites. New AML sites are typically found every year; therefore, current database records might not be all inclusive of every AML site in the planning area (Schuler 2005).

Extreme physical hazards are common at abandoned mine sites; and for the visitor, these hazards are not always apparent. Abandoned mine sites have proven to be a luring and sometimes life-threatening attraction for both children and adults. Serious injury or death may occur at these sites. Common hazards include open vertical shafts; unstable overhead rock and decayed support structures; deadly gases and lack of oxygen; remnant explosives and toxic chemicals; high walls, open pits, and open drill holes; and becoming lost and disoriented while underground. Subsidence at abandoned coal mines and coal fires pose additional hazards. The Wyoming State Office has a prioritized list of AML sites that pose the greatest risk to people and the environment.

AML sites impacting water quality are addressed using the watershed approach. Using this approach accomplishes the following objectives:

- Allows for mitigation to be risk-based by identifying priority sites first
- Fosters collaborative efforts across federal, state, and private administrative boundaries
- Considers all issues important to water resource protection
- Reduces the cost of mitigation
- Provides the most efficient method of remediating AML sites by utilizing a wide range of available resources.

In 1999, the BLM and the Wyoming DEQ, Abandoned Mine Land Division signed a cooperative agreement that further facilitated the reclamation of AML sites on BLM-administered lands. The state program, as required by the Surface Mining Control and Reclamation Act of 1977, focuses on public safety hazards. In addition, the BLM has received some funding within its Soil, Water, and Air Program to address environmental hazards and watershed concerns associated with abandoned mines on a site-specific basis. By combining available funding, safety hazards and environmental impacts to water quality and watershed function can continue to be addressed in a more comprehensive fashion at priority AML sites. In this collaborative partnership approach, the BLM and the Wyoming DEQ, Abandoned Mine Land Division are undertaking several AML reclamation projects on public lands within the planning area.

Formerly Used Defense Sites (FUDS)

Six FUDS are located on public surface within the planning area. Before being reverted to the U.S. Department of the Interior (USDI), these FUDS were military properties primarily used as target ranges. The Department of Defense retains the responsibility for any remaining ordnance, explosives, and

munitions on public surface. The U.S. Army Corp of Engineers (USACE) is responsible for implementing the FUDS cleanup program.

The BLM supports USACE cleanup activities by doing the following:

- Providing access for investigations, surveys, and cleanup activities
- Providing stipulations to protect natural and cultural resources
- Assisting in developing appropriate cleanup standards.

Although no extensive on-the-ground investigations have been performed, initial reports conducted by the USACE indicate that various hazards are potentially present. They include unexploded ordnance, lead contamination, metal fragments, ammunition casings, and abandoned structures.

Hazardous Materials and Wastes

Within the planning area, spills, illegal dumping, and hazardous material releases are investigated to determine the need for immediate cleanup or other long-term remediation actions. This often involves working with the U.S. Environmental Protection Agency, Wyoming DEQ, and potentially responsible parties to fund and expedite the cleanup of hazardous sites and disposal activities that result from recreational use and industrial activities, such as oil and gas development.

3.8.4 Environmental Justice

Environmental justice pertains to fair treatment and meaningful involvement of minority and low-income populations. Where the impacts of a proposed federal action may involve such populations, an analysis of the potential for disproportionate impacts and meaningful community outreach and public involvement is required.

The BLM does not manage environmental justice resources; rather, it manages public lands and the resources and uses that occur on them. Analysis of environmental justice impacts and meaningful involvement of minority and low-income populations in the planning process are required by federal regulations and policies. No specific management issues or concerns have been identified to date, including in the scoping process.

Minority Populations

BLM Instruction Memorandum (IM) 2002-164, "Guidance to Address Environmental Justice in Land Use Plans and Related NEPA Documents," provides policy and guidance for addressing environmental justice in BLM land use planning (BLM 2002e). IM 2002-164 defines minority persons as "Black/African American, Hispanic, Asian and Pacific Islander, American Indian, Eskimo, Aleut, and other non-white persons." Furthermore, IM 2002-164 indicates that an area should be considered to contain a minority population where either the minority population of the affected area exceeds 50 percent, or the percentage of minority population in the affected area is meaningfully greater than the percentage in the general population.

Populations of the four counties that overlap the planning area are predominantly white and non-Hispanic. All four counties have a larger proportion of non-Hispanic white residents than does the state, and only Goshen County has a higher proportion of Hispanic or Latino residents than the state overall. Table 3-40 provides a summary of population by race and ethnicity in 2000.

Table 3-40. Racial and Ethnic Groups for Casper Planning Area Counties, and Wyoming (Percent of Population in 2000)[1]

Race or Ethnicity	Natrona	Converse	Platte	Goshen	Wyoming
Non-Hispanic, White	91.7	91.9	92.9	89.1	88.9
Non-Hispanic, Black	0.7	0.1	0.0	0.2	0.7
Non-Hispanic, American Indian/Alaska Native	0.9	0.8	0.4	0.7	2.1
Non-Hispanic, Asian, Native Hawaiian, or Pacific Islander	0.4	0.3	0.1	0.3	0.6
Non-Hispanic, some other race	0.1	0.2	0.3	0.0	0.1
Non-Hispanic, two or more races	1.3	1.2	1.0	0.8	1.2
Hispanic or Latino (of any race)[2]	4.9	5.5	5.3	8.8	6.4

Source: U.S. Census Bureau 2002

[1]Detail may not add up to 100 percent due to rounding.

[2]Hispanic/Latino breakout is separate because Hispanics/Latinos can be of any race.

As Table 3-40 shows, the percentage of minority residents does not exceed either 50 percent or the proportion for Wyoming in any of the four counties in the planning area. Thus, none of the four counties contain a minority population that is meaningfully greater than the general population. In addition, there are no Native American reservations in the planning area. The Cedar Ridge site and other sites have cultural significance to members of tribes living in the area. The cultural significance of these sites is addressed in the Cultural Resources section of this document.

Low-Income Populations

With respect to low-income populations, IM 2002-164 indicates that low-income populations can be identified according to poverty thresholds published by the U. S. Census Bureau. In addition, the IM notes that "when considering these definitions, it is important to recognize that some low-income and minority populations may comprise transitory users of the public lands and thus not associated with a particular geographic area."

The Council on Environmental Quality (CEQ) guidance for environmental justice analysis under NEPA defines a "low-income population" as "either a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect" (CEQ 1997). Although CEQ guidance does not provide a quantitative threshold (e.g., a limit on the percent of persons in poverty) for determining whether a population should be considered a low-income population, typically the percent of persons in poverty in the study area is compared to that in a comparison area such as the state. Quantitative criteria for what constitutes a low-income population are not specified in BLM, CEQ, or EPA guidance.

In 1999, 11.4 percent of the persons living in Wyoming had incomes below the poverty level. This compares to 11.8 percent in Natrona County, 11.6 percent in Converse County, 11.7 percent in Platte County, and 13.9 percent in Goshen County (Sonoran Institute 2003a; Sonoran Institute 2003b; Sonoran Institute 2003c; Sonoran Institute 2003d). There are no substantial concentrations of persons living in poverty in the planning area.

3.8.5 Tribal Treaty Rights

American Indians inhabited the planning area region for thousands of years before European contact. American Indians used the region for hunting, fishing, and collecting plant foods, as well as for religious ceremonies and burial of the dead. The lands managed by the Casper Field Office fall within the

judicially established Indian land areas of the Sioux, Northern Cheyenne, and Northern Arapaho (USACE 1999). The planning area also includes traditional lands of the Eastern Shoshone, who were not part of the judicially established lands because they had their reservation. The Casper Field Office consults with the tribes listed below regarding American Indian issues and concerns.

- Blackfeet Nation
- Cheyenne River Sioux Tribe
- Comanche Tribe of Oklahoma
- Confederated Salish and Kootenai Tribe
- Crow Tribe
- Eastern Shoshone Tribe
- Kiowa Tribe of Oklahoma
- Lower Brule Sioux Tribe
- Nez Perce Tribe
- Northern Arapaho Tribe
- Northern Cheyenne Tribe
- Oglala Lakota Nation
- Rosebud Sioux Tribe
- Shoshone-Bannock Tribes
- Ute Tribe.

American Indian treaty rights or trust responsibility issues are not known for the planning area. There are no trust lands in the planning area, no reservation lands, and no tribal properties as far as the BLM is aware. Hunting or fishing rights designated by the treaty are handled by the WGFD and are not part of the BLM planning effort.

During the 1800s, the U.S. government negotiated treaties with Indian tribal governments and obtained the vast majority of public domain land in the lower 48 states. Treaties are negotiated settlements that define federal obligations toward Indian tribes. Some 60 tribes negotiated and reserved their treaty rights to off-reservation lands and resources. The rights reserved to Indian tribes vary substantially from treaty to treaty. Hunting, fishing, and gathering rights and certain other land uses are the most common rights reserved through treaty (BLM 1990; BLM 1994b). Treaties affecting tribes in the planning area region are summarized below.

1851 Treaty of Fort Laramie. This treaty was between and among the U.S. government and the Sioux, Cheyenne, Arapaho, Crow, Assinaboin, Gros Ventre, Mandan, and Arikara people. The treaty established territorial boundaries and annual compensation for the Indian nations involved.

1868 Treaty of Fort Laramie. This treaty was between and among the U.S. government and the Sioux, Brule, Oglala, Miniconjou, Yanktonai, Hunkpapa, Blackfeet, Cuthead, Two Kettle, Sans Arcs, Santee, and Arapaho. The “Great Sioux Reservation” established by this treaty encompassed most of what is now western South Dakota. Unceded Indian hunting lands associated with the treaty extended westward from the reservation into the vicinity of the planning area, east of the Bighorn Mountains and north of the North Platte River. The treaty reserved the right of the Indians to hunt on the unceded lands “so long as buffalo may range there in numbers sufficient to justify the chase.”

1863 Treaty of Fort Bridger. This treaty was an agreement between the U.S. government and the Eastern Bands of Shoshone. The treaty set the boundaries of the Eastern Shoshones to reflect their traditional base since the early 1800s, from the upper Snake River on the north, east to the Wind River Mountains, south into northern Colorado and Utah. The reservation established by this treaty included

44,672,000 acres in Colorado, Utah, Idaho, and Wyoming. It did not include the present-day boundaries of the Wind River Reservation east of the Wind River Mountains. Under the terms of the 1851 Treaty of Fort Laramie, the Crow people had been given almost all of the land now encompassed by the Wind River Reservation (east of the Wind River Mountains) (Stamm 1999).

1868 Treaty of Fort Bridger. This treaty was an agreement between the U.S. government and the Eastern Shoshone and Bannock tribes. It established the boundaries of the Wind River Reservation (now 3,054,182 acres) (Eastern Shoshone Tribe 2004). Unlike the 1863 Treaty of Fort Bridger, which outlined boundaries of Shoshone territory west of the Wind River Mountains, the 1868 Treaty gave the tribe the right to occupy what had been their hunting grounds and winter camps to the east (Stamm 2003). In so doing, it denied claims to the Wind River valley made by competing tribes such as the Arapaho, Crow, or Oglala Sioux (Stamm 2003). The Wind River Reservation was later reduced in size by the Brunot Agreement of 1872 and the McLaughlin Agreement of 1898 (Eastern Shoshone Tribe 2004).

Trust Responsibilities

Trust responsibility is the U.S. government's permanent legal obligation to exercise statutory and other legal authorities to protect tribal lands, assets, resources, and treaty rights, as well as a duty to carry out the mandates of federal law with respect to American Indian tribes. BLM Manual 8160 (BLM 1990)—"Native American Coordination and Consultation"—defines trust responsibility as the obligation of the BLM to make "a reasonable and good faith effort to identify and consider, and to carry out programs in a manner sensitive to and consistent with, Native American concerns and tribal government planning and resource management programs."

Treaty Rights and Trust Responsibilities Policy

It is the policy of the USDI to recognize and fulfill its legal obligations to identify, protect, and conserve the trust resources of federally recognized Indian tribes and tribal members, and to consult with tribes on a government-to-government basis whenever plans or actions affect tribal trust resources, trust assets, or tribal health and safety (USDI 1995).

It is the policy of the BLM to do the following:

- Recognize traditional Native American cultural and religious values as an important living part of our Nation's heritage, and develop the capability to address adequately any potential disruption of the traditional expression or maintenance of these values that might result from BLM land use decisions.
- Coordinate and consult regularly with appropriate Native American groups to identify and consider their concerns in BLM land use planning and decisionmaking, and document fully all coordination and consultation efforts.
- Review proposed land use planning decisions and other major BLM decisions for consistency with tribal land use and resource allocation plans.
- Participate in developing consistent interagency guidance, procedures, and expertise to address Native American and tribal government policies and programs.
- Avoid unnecessary interference with Native American religious practices.
- Protect sensitive and confidential information about Native American values, practices, and specific locations with which they are associated from disclosure to the public, to the greatest degree possible under law and regulation (BLM 1990).

There are no management actions specifically identified for Tribal Treaty rights; however, Heritage Resources identifies the ongoing need for Native American consultation.

This page intentionally left blank.

CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

Roadmap to Chapter 4

Chapter 4 discussions are grouped by general resource topics, as outlined below.

4.1. Physical Resources (Page 4-5)

- Air Quality
- Geologic Resources
- Soil
- Water

4.2. Mineral Resources (Page 4-26)

- Locatable
- Leasable
  - Coal
  - Geothermal
  - Oil and Gas
  - Other Solid Leasables
- Salable

4.3. Fire Management and Ecology Resources (Page 4-50)

- Unplanned/Wildland Fire
- Planned/Prescribed Fire
- Rehabilitation

4.4. Biological Resources (Page 4-59)

- Vegetation
  - Forests, Woodlands, and Forest Products
  - Grassland and Shrubland Communities
  - Invasive, Nonnative Plant Species and Pest Control
  - Riparian and Wetland Communities
- Fish and Wildlife Resources
  - Fish
  - Wildlife
- Special Status Species
  - Plants
  - Fish
  - Wildlife

4.5. Heritage and Visual Resources (Page 4-177)

- Cultural
- Paleontological
- Visual Resources

4.6. Land Resources (Page 4-196)

- Lands and Realty
- Renewable Energy
- Rights-of-Way and Corridors
- Transportation
- Off-Highway Vehicles (OHV)
- Livestock Grazing
- Recreation

4.7. Special Designations (Page 4-233)

- Areas of Critical Environmental Concern and Special Management Areas
- National Back Country Byways
- National Historic Trails and Other Historic Trails
- Wild and Scenic Rivers

4.8. Socioeconomic Resources (Page 4-277)

- Social Conditions
- Economic Conditions
- Health and Safety
- Environmental Justice
- Tribal Treaty Rights

4.9. Cumulative Impacts (Page 4-296)

4.10 Irreversible and Irretrievable Commitment of Resources (Page 4-309)

4.11. Unavoidable Adverse Impacts (Page 4-310)

CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

This chapter describes environmental consequences that may result from implementing the five alternatives described in Chapter 2. The purpose of this chapter is to analyze and disclose potential significant impacts of the federal action on the human environment. The federal action for this Environmental Impact Statement (EIS) is the Bureau of Land Management's (BLM's) selection of an alternative on which future land use actions would be based.

The potential consequences of each alternative are described in this chapter as impacts using the same order of eight resource topics (e.g., Physical Resources, Mineral Resources, etc.) presented in Chapter 3. Identical organization for chapters 3 and 4 allows the reader to compare existing resource conditions (Chapter 3) to potential impacts (Chapter 4) for the same resources. The analysis of environmental consequences focuses on key planning issues (see Chapter 1) raised during the scoping process rather than providing an encyclopedic discussion of all possible consequences. Each resource or resource use in this Chapter is organized as described below.

Introduction

The discussion of environmental consequences for each resource program begins with a brief definition of what is considered an impact for the resource. When applicable, definitions of the following types of impacts are also included.

Beneficial/Adverse Impacts. When applicable, beneficial and adverse impacts are differentiated in this chapter. For example, an alternative that increases the number of surface water reservoirs constructed within the North Platte watershed is expected to have a beneficial impact on select local fish and recreation; however, if this alternative also increases water depletion (via evaporation) in the Platte River watershed, it may adversely impact downstream special status species such as the pallid sturgeon. The presentation of both beneficial and adverse impacts for key planning issues is intended to provide the BLM decisionmaker and reader with an understanding of the multiple use tradeoffs associated with each alternative. However, all possible impacts are not described and, unless otherwise stated, impacts described in this chapter are assumed to be adverse.

Direct/Indirect Impacts. In general, direct impacts result from activities authorized by the BLM and generally occur at the same time and place as the management activity or action causing the impact. For example, for the action of building a road, a direct adverse impact is surface disturbance. Surface disturbance is the impact (the effect) of heavy equipment (the cause) removing existing vegetation as it grades the proposed road location. Indirect impacts often occur at some distance or time from the action. In the above example, an indirect impact could occur days after the surface is disturbed and some distance from the disturbance. Heavy precipitation following the removal of vegetation and disturbance of the ground surface could erode soil and transport sediment into streams. The impact on stream-water quality is considered an indirect adverse impact.

Short- or Long-Term Impacts. Where applicable, the short-term or long-term aspects of impacts are described in this chapter. For purposes of this EIS, short-term impacts occur during or after the activity or action and may continue for a period of up to 5 years. Long-term impacts occur beyond the first 5 years. Five years is an approximation of the time required to restore or reclaim an area following surface disturbance.

Methods and Assumptions

Due to the programmatic and strategic nature of the Resource Management Plan (RMP) alternatives, the timing and specific location of project-specific actions that could impact resource values are not defined. Moreover, the relationship between cause (future actions) and effect (impact on resources) is not always known or quantifiable. For these reasons, the analysis of alternatives is both qualitative and quantitative and based on a series of assumptions. The methods and assumptions listed below, and for each resource in the following sections, are disclosed to provide a basis for the conclusions reached in this chapter. Assumptions common to all alternatives and all resources are listed below, whereas assumptions unique to specific resources and resource uses are listed under Methods and Assumptions in the appropriate resource section.

- All alternatives are implemented in compliance with standard practices, best management practices (BMPs), guidelines for surface-disturbing activities, and Mitigation Guidelines (Appendices I, K and N). In other words, the practices and guidelines included in Appendices K and N are considered a component of each alternative. Appendix N lists standard practices used in the planning area to mitigate adverse impacts caused by surface-disturbing activities. Appendix K is a reference to BMPs.
- An oil and gas lease grants the lessee the "right and privilege to drill for, mine, extract, remove and dispose of all oil and gas deposits" in the leased lands, subject to the terms and conditions incorporated in the lease (BLM Form 3100-11, Lease for Oil and Gas). Because the Secretary of the Interior has the authority and responsibility to protect the environment within federal oil and gas leases, restrictions are imposed on the lease terms.
- The Tenth Circuit Court of Appeals in Sierra Club vs. Peterson (717 F.2d 1409, 1983) found that "on land leased without an NSO stipulation, the DOI cannot deny the permit to drill…once the land is leased the DOI no longer has the authority to preclude surface-disturbing activities even if the environmental impact of such activity is significant. The Department can only impose mitigation upon a lessee who pursues surface-disturbing exploration and/or drilling activities." The court goes on to say "notwithstanding the assurance that a later site-specific environmental analysis will be made, in issuing these leases the DOI has made an irrevocable commitment to allow some surface-disturbing activities, including drilling and road building."
- Provisions in leases that expressly provide Secretarial authority to deny or restrict development in whole or in part depend on an opinion provided by the USFWS regarding impacts to endangered or threatened species or habitats of plants and animals that are listed or proposed for listing. If the USFWS concludes that the development likely would jeopardize the continued existence of any endangered or threatened plant or animal species, then the development may be denied in whole or in part.
- Although not defined as a surface-disturbing activity, concentrated livestock and native ungulate grazing, off-highway vehicle (OHV) use, and fire may remove vegetation and expose the soil surface leading to increased erosion.
- Comparison of impacts among resources is intended to provide an impartial assessment to inform the decisionmaker and the public. The impact analysis does not imply or assign a value or numerical ranking to impacts. Actions resulting in adverse impacts to one resource may impart a beneficial impact to other resources.
- Key planning issues identified in Chapter 1 provide the focus for the scope of impact analyses in this chapter.

- In general, adverse impacts described in this chapter are considered significant if they result from or relate to the key planning issues described in Chapter 1 and the context or intensity of impacts suggest potential impacts to public health and safety; potential for violating legal standards, laws, or protective status of resources; or potential impacts to unique resources.
- The comparison of individual alternatives is qualitative, relative to Alternative A (current management), and based on professional judgment and consideration of the context and intensity of allowable uses and management actions that are anticipated to impact resources and resource uses.
- Analysis of environmental consequences considered the extent of projected surface disturbance and associated development from BLM actions.
- BLM policy in Wyoming does not allow disposal of oil and gas produced water on BLM-administered surface lands using surface application methods, such as irrigation (BLM 2005d). Analysis assumes that this policy, the limited anticipated quantity of produced water in the planning area, and water-quality regulation by the Wyoming Department of Environmental quality (DEQ) will avoid significant adverse impacts to water quality in the planning area from well-produced water under any alternative.
- The analysis of impacts reflects the anticipated consequences of alternatives on individual resources; for example, the impact of alternatives on invasive nonnative plant species (INPS). The anticipated impacts of individual resources on other resources are discussed in the appropriate sections. For example, the impact of INPS on wildlife is described in the wildlife section—not in the INPS section.
- The analysis of impacts focuses on the anticipated incremental and meaningful impact of management actions and allowable uses proposed for each alternative. The impact of past and present actions is encompassed within the description of existing conditions in Chapter 3, Affected Environment.
- The definition of surface-disturbing activities used for analysis is provided in the Glossary (Volume 2). Surface disturbance typically is described in terms of the total short- or long-term disturbance of BLM actions, as shown in Table 4-1. Refer to Appendix M for projected surface disturbance associated within individual reasonable foreseeable actions (RFAs). Surface disturbance for new wells that are later abandoned is reclaimed and accounted for in surface disturbance acreage in Appendix M.
- Under all alternatives, appropriate threatened and endangered species surveys will be conducted where applicable during the appropriate season.

Table 4-1. Total Projected Surface Disturbance from BLM Reasonable Foreseeable Actions in the Casper Planning Area

Action	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Total Acres Short-Term Disturbance from BLM Actions	59,990	36,650	58,689	63,649	61,274
Total Acres Reclaimed from BLM Actions	38,903	25,085	38,331	41,569	39,602
Total Acres Long-Term Disturbance from BLM Actions	21,087	11,565	20,358	22,080	21,672

Source: Appendix M, Table M-1
BLM Bureau of Land Management

Analysis of Alternatives

The analysis of alternatives describes how each alternative could affect baseline conditions of individual resources in the planning area. Impacts typically are described by topic such as surface disturbance, other resources or resource uses, and proactive management actions. Proactive management actions generally include management actions anticipated to protect or enhance the resource of interest. For example, proactive management actions for soils include prohibiting or restricting surface-disturbing activities on steep slopes or highly erosive soils. If a particular allowable use or management action is not discussed for a resource, it is because no impacts are expected or the anticipated impact is not considered significant.

Conclusion

The conclusion section for each resource and resource use briefly highlights the overall impacts of alternatives relative to which alternatives are projected to have the most and least impacts. Action Alternatives are compared to the No Action Alternative (Alternative A). In some cases, there are no discernable differences in impacts from alternatives.

Cumulative Impacts

Cumulative impacts are described in the Cumulative Impacts Section of this chapter. Cumulative impacts combine the past and present impacts encompassed in existing conditions described in Chapter 3 with the anticipated incremental impacts of alternatives described in the sections of this chapter and the impacts of reasonably foreseeable future actions. The Cumulative Impacts Section also includes anticipated incremental impacts of non-BLM RFAs.

4.1 Physical Resources

The Physical Resources section describes the potential impacts to air quality, geologic resources, soil, and water resources with respect to each alternative. Within each resource, impacts common to all alternatives and the methods and assumptions used for the analysis are described.

4.1.1 Air Quality

Actions that could occur through implementation of each alternative have the potential to affect future air quality within the region ("region" includes the planning area and Class I areas within 100 miles). This section describes the impacts of each alternative on air quality in terms of short-term and long-term impacts.

4.1.1.1 Methods and Assumptions

The air quality analysis estimated emissions associated with proposed management actions for each project alternative. The analysis focused on emissions associated with a year of peak construction activity (year 2006) and operational emissions approximately 10 and 20 years in the future (years 2011 and 2020). As a reasonably conservative approach, the analysis included the peak annual construction emissions to years 2011 and 2020 operational emissions to estimate total annual emissions for these years. Years 2011 and 2020 emissions were compared to year 2001 existing emissions to determine the future change in emission levels for each project alternative. The analysis then presents qualitative descriptions of potential air quality impacts within the region for air quality. This qualitative analysis, rather than a quantitative analysis approach, was used because sufficient site-specific data were not available regarding future proposed activities and because the Wyoming DEQ would require demonstration of compliance with federal and state air quality regulations and standards for any substantial future development action under their jurisdiction. Given the uncertainties concerning the number, nature, and specific location of future emission sources and activities, the emission comparison approach provides an appropriate basis to compare the potential impacts under the various alternatives. Refer to Appendix J for the Air Quality Impact Technical Support Document.

Activity data used to estimate emissions for proposed emission sources were obtained from Casper Field Office staff and National Environmental Policy Act (NEPA) analyses performed for BLM actions within Wyoming that are similar to those associated with the actions proposed in this EIS (BLM 2002f; BLM 2005e). Emission factors used to estimate proposed emissions were obtained from (1) the U.S. Environmental Protection Agency (EPA) NONROAD Emissions Model (EPA 2004); (2) Wyoming DEQ best available control technology (BACT) levels for natural gas-fired internal combustion engines (Hanify 2006 and Wyoming DEQ 2000); (3) MOBILE6 emissions models for on-road vehicles (EPA 2003); and (4) special studies on fugitive dust emissions. The Air Quality Impact Technical Support Document (Appendix J) includes data and assumptions used to estimate emissions for each project alternative.

Methods and assumptions used in this impact analysis include the following:

- Stationary sources associated with oil and gas development would operate at emission levels based on currently observed BACT levels.
- Activity data associated with management actions other than those related to conventional and coalbed natural gas (CBNG) wells were averaged over the entire analysis period to produce annual average emissions.
- Assuming the current rate of mining in the planning area continues, existing coal leases provide sufficient reserves through 2030.

- EPA off-road emission standards were used to estimate emissions for non-road sources in project years 2006/2011/2020. This approach simulates the replacement of existing sources by new lower-emitting equipment with future EPA off-road emission standards.
- The analysis in this section only estimated emissions from permitted activities that would occur on federal lands within the planning area.
- Use of water application as a BMP would reduce fugitive dust emissions from ground-disturbing activities during construction/reclamation and maintenance of roads by 50 percent from uncontrolled levels.

The analysis calculated emissions for the following nine types of development and use activities: (1) CBNG, (2) conventional oil and natural gas, (3) coal mine, (4) rights-of-ways (ROWs), (5) livestock management, (6) OHV, (7) resource roads, (8) salable and locatable minerals, (9) fire management (including prescribed fire), (10) forest and woodlands, (11) renewable energy development, and (12) vegetation management. Emissions from activities related to cultural resources, paleontology, recreation, noxious and invasive weed control, forest and woodlands, and wildlife and fish were assumed to produce inconsequential amounts of air emissions.

The project planning area for air quality includes the planning area and federal Class I areas within 100 miles. The nearest federal Class I areas to the planning area are the Bridger National Wilderness Area in Sublette County (approximately 90 miles to the west), Fitzpatrick National Wilderness Area in Fremont County (approximately 100 miles to the west), and Wind Cave National Park in South Dakota (approximately 75 miles to the east).

Table 4-2 summarizes the annual emissions anticipated under each alternative.

Table 4-2. Total Annual Emissions Summary for BLM Activities within the Casper Planning Area

Summary Year	Emissions (tons per year)						
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	CO	VOC	HAP
Base Year (2001) Totals	1,116	241	1,311	84	1,016	2,858	293
Alternative A							
2011 Total	1,361	290	1,367	80	1,947	4,193	458
2020 Total	1,381	306	1,498	83	2,354	4,853	527
Alternative B							
2011 Total	1,115	226	715	25	1,597	1,053	116
2020 Total	1,197	248	773	27	1,886	1,103	122
Alternative C							
2011 Total	1,457	300	1,307	75	1,924	3,921	428
2020 Total	1,475	315	1,429	78	2,320	4,502	489
Alternative D							
2011 Total	1,697	334	1,376	81	1,981	4,144	453
2020 Total	1,718	350	1,500	83	2,385	4,805	522
Alternative E (Preferred Alternative)							
2011 Total	1,486	306	1,369	80	1,958	4,194	458
2020 Total	1,506	323	1,497	83	2,364	4,820	524

Source: Appendix J
CO carbon monoxide
HAP hazardous air pollutant
NO_x nitrogen oxides
PM_{10} particulate matter less than 10 microns in diameter
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
SO_x sulfur oxides
VOC volatile organic compound

4.1.1.2 Analysis of Alternatives

Impacts Common to All Alternatives

Air quality impacts from these actions would primarily result from minerals development and production and oil and gas production, as potential emissions associated with these actions would substantially outweigh those produced from any other proposed activity.

Short-term air quality impacts from minerals development and production would occur from six sources: (1) combustive emissions (vehicle tailpipe and exhaust stack emissions) due to the operation of mobile and stationary source construction equipment, (2) fugitive dust emissions (particulate matter less than 10 microns in diameter [PM_{10}]) due to earthmoving activities and the operation of vehicles on unpaved surfaces, (3) nitrogen oxides (NO_X) emissions from blasting, (4) particulate matter emissions from blasting, (5) coal fines blowing off trains hauling coal out of the basin, and (6) diesel emissions from those same trains. Minerals production would generate long-term combustive and fugitive dust emissions from two sources: (1) stationary sources, such as natural gas flaring, natural gas-fired compressors, and minerals storage and handling equipment; and (2) mobile sources that access and service oil and gas facilities and extract and handle subsurface minerals, such as coal and hard minerals. Minerals reclamation activities also would produce combustive and fugitive dust.

The project alternatives may have the potential to impact AQRVs within the Bridger and Fitzpatrick national wilderness areas and the Wind Cave National Park (federal Class I areas). Previous quantitative air quality analyses have shown that emission sources potentially can impact Class I areas up to 200 miles away (i.e., Powder River Basin EIS). Although minerals development and production and oil and gas production would be the primary sources of emissions, other resource management actions that could produce combustive and (or) fugitive dust emissions include the following:

1. Forestry production due to road construction, logging equipment usage, slash burning, and prescribed burns.
2. Fire management due to the combustion of vegetation from prescribed burns and wildland fire, combustive emissions from the use of fire suppression equipment, and fugitive dust from the use of fire suppression equipment on unpaved roads; emissions from prescribed burns and wildland fire would depend on fuel and meteorological conditions
3. Road maintenance due to the use of grading equipment on unpaved roads
4. ROWs due to combustive and fugitive dust emissions from equipment used to construct proposed infrastructure
5. OHV use due to vehicle usage on unpaved surfaces.

The Wyoming DEQ has the authority to implement emission controls for sources that require air permits under the Wyoming Air Quality Standards and Regulations (WAQSR) and to ensure that these sources would not contribute to an exceedance of an ambient air quality standard. To facilitate this process, the BLM currently implements a program to share emission source information with the Wyoming DEQ and other government agencies. This program would continue under all alternatives. In addition, the BLM will require implementation of BMPs within its authority to minimize impacts, such as fugitive dust emissions in proximity to high use roadways, populated areas, and resource-sensitive areas. Prior to project approval, BLM will conduct environmental analyses in compliance with NEPA.Alternative A

Figure 4-1 presents a summary of annual emissions for the base year (2001) and for 2011 for each alternative. Figure 4-2 presents a summary of annual emissions for the base year and for 2020 for each

alternative. The detailed spreadsheets that serve as the basis of these charts, along with the emission calculations and emission summary tables, are provided in Appendix J.

Figure 4-2 also shows that Alternative A would result in increased emission levels for all pollutants except SO_x by 2020, compared to existing conditions in year 2001. The most substantial increases are projected to be CO, VOC and HAPs emissions, increasing by 1,338 tons (132%), 1,994 tons (70%), and 234 tons (80%), respectively, from 2001 levels. The largest source of these increased emissions is the new development of oil and natural gas production in the planning area.

The planning area is a large irregularly shaped region with a maximum east-west extent of 175 miles and a north-south extent of 125 miles. Given the generally good air quality currently existing in the region and the expected separation of sources within the planning area, it is unlikely emissions from Alternative A would contribute to an exceedance of a national or state ambient air quality standard. There could be localized air quality impacts depending on the locations and emission levels of proposed sources in the area, the surrounding topographical characteristics, and the site-specific meteorology.

The impacts of these future air emissions at pristine Class I areas under Alternative A are difficult to estimate with any level of confidence without information on the specific locations and characteristics of projected sources in the planning area. Detailed air dispersion modeling can be used to estimate these impacts, but the modeling is very sensitive to atmospheric conditions and to the exact locations and the emission levels of the proposed sources in the planning area. In addition, the Wyoming DEQ air-permitting processes will require larger development projects to identify the locations for specific emission sources, to demonstrate with dispersion modeling analyses that proposed emissions would not adversely impact AQRVs in Class I areas.

Figure 4-1. Project Emissions from BLM Activities within the Casper Planning Area: Year 2011

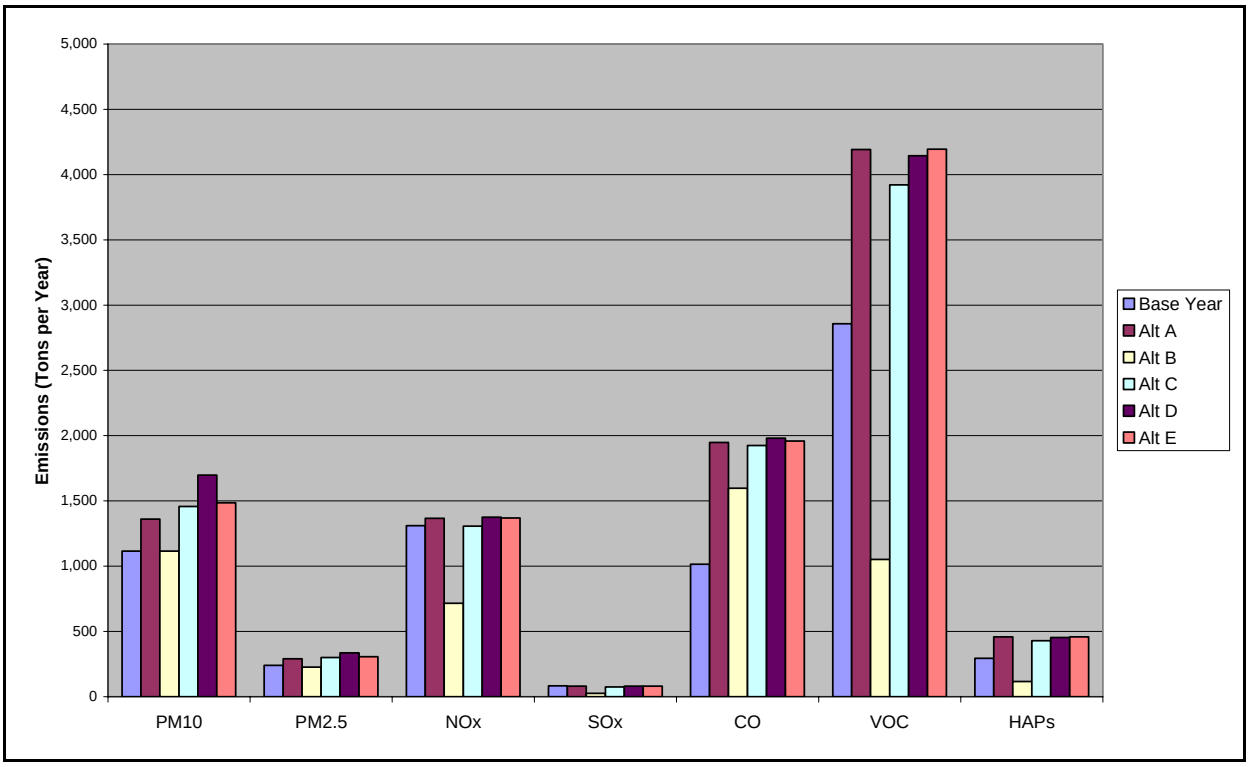
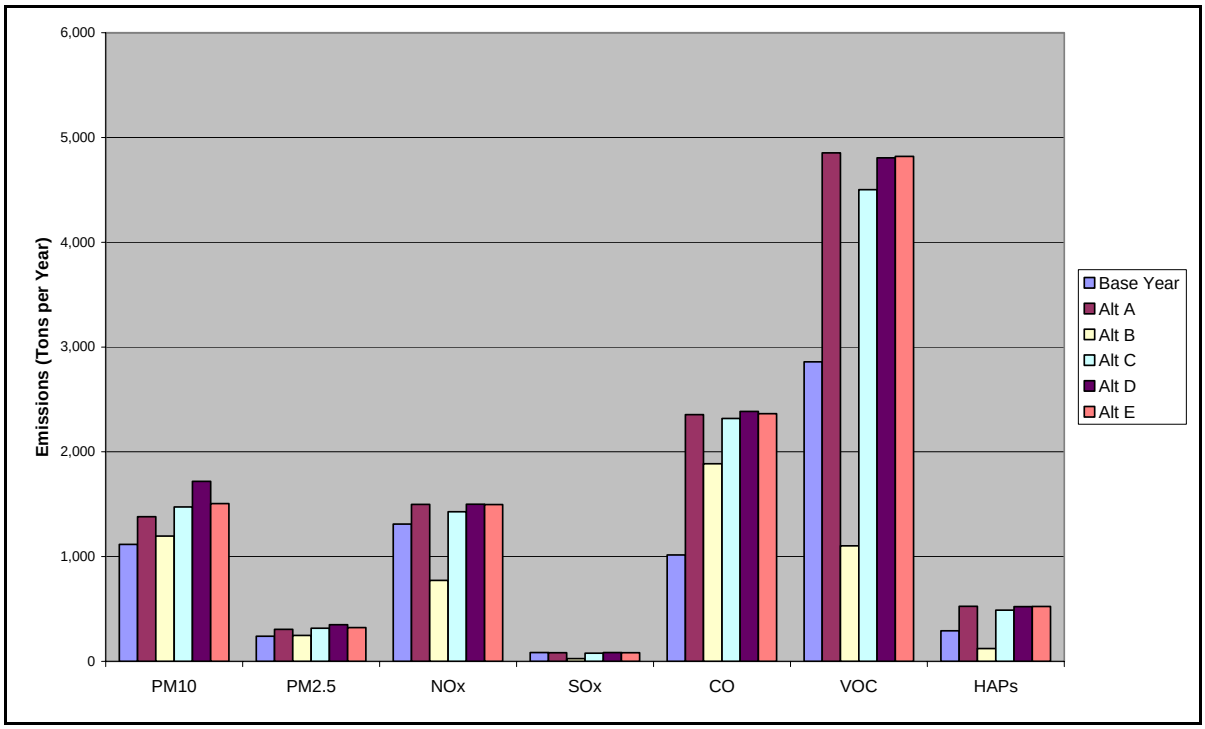


Figure 4-2. Project Emissions from BLM Activities within the Casper Planning Area: Year 2020



In addition to the proposed sources of hazardous air pollutants (HAPs) within the planning area, there also may be emissions of hydrogen sulfide (H_2S). These sources would include fossil fuel combustion, fugitive volatile organic compounds (VOCs), and emissions due to oil and gas production. The accidental release of sour natural gas (rich in H_2S) poses the main risk under Alternative A. Another source of release of H_2S is at oil and gas fields where secondary recovery operations are occurring. To mitigate H_2S impacts, applications for permit to drill (APDs) in sour gas areas would include a contingency plan that may include requirements to monitor wind speed, wind direction, and atmospheric stability and to conduct dispersion modeling analyses. These requirements would apply to areas where public health and safety or important resource values are a concern, such as proposed well sites in proximity to residences. If the BLM determines after review of a contingency plan that additional data or safety precautions are needed, the BLM would require these items as conditions of approval (COAs). The potential release of H_2S during production operations in sour gas areas may be mitigated by health and safety plans.

The BLM would consider implementing mitigation actions within its authority to reduce emissions under Alternative A, such as selecting projects with smaller area coverage, fewer units, or less ground disturbance, or choosing projects with improved designs that minimize air emissions. The BLM intends to use dispersion modeling to estimate the impacts of projects whose emissions have not been analyzed before, but might be significant. If an analysis shows that significant impacts are possible, mitigation measures similar to those presented in Appendix L may be recommended. The BLM also would facilitate discussions with stakeholders to implement mitigation beyond the BLM's authority to reduce proposed emissions, including considering a program to offset emissions from proposed projects, and reducing emissions from existing sources by techniques such as retrofits with more stringent BACT.

Alternative B

Figure 4-1 and Figure 4-2 present an estimate of base year and future annual emissions for each alternative in years 2011 and 2020, respectively. Figure 4-2 shows that compared to the 2001 base year emissions, in 2020, Alternative B would result in the lowest increase in emissions of any of the

alternatives, with modest increases in PM_{10} emissions (81 tons or 7%), $PM_{2.5}$ (7 tons or 3%), and CO emissions (870 tons or 86%). VOC emissions dropped -1,755 tons or 61 percent due to the conservation measures incorporated into Alternative B, resulting in the lowest natural gas production of all alternatives, the primary source of VOC emissions.

As a result, this alternative would result in impacts to AQRV's at the nearest Class I areas similar to base year conditions. In addition, given the generally good air quality currently existing in the region, emissions from Alternative B would not be expected to contribute to an exceedance of NAAQS or WAAQS. Implementation of the mitigation identified for Alternative A also would reduce emissions and air quality impacts associated with Alternative B.

Alternative C

Figure 4-2 shows that Alternative C would result in moderately increased emission levels for all pollutants by 2020, compared to existing conditions in year 2001. The most significant increases are projected to be PM_{10}, CO, and HAPs emissions, with an increase of 359 tons (32%), 1,303 tons (128%), and 1,196 tons (67%), respectively, from 2001 levels. As shown in Figure 4-2, the emission increases under Alternative C over base year conditions are similar, but somewhat lower, for several pollutants than Alternative A, but substantially higher than Alternative B. The primary source of these increased emissions from base year conditions is the new development of oil and natural gas production in the planning area.

The air quality impacts under Alternative C should be very similar to the impacts under Alternative A. It is likely that emissions under Alternative C would not contribute to an exceedance of an NAAQS or WAAQS due to the generally good air quality currently existing in the region. In addition, given the moderate level of emission increases that will be spread over relatively large distances under Alternative C, this alternative is not expected to cause adverse impacts to AQRVs in the nearby national wilderness areas (NWAs). Implementing the mitigation identified for Alternative A also would reduce emissions and air quality impacts associated with Alternative C.

Alternative D

Figure 4-2 shows that Alternative D would result in moderately increased emission levels for all pollutants by 2020, compared to existing conditions in year 2001. The most substantial increases are projected to be CO, VOC, and HAPs emissions, with an increase of 1,369 tons (135%), 1.947 tons (68%), and 229 tons (78%), respectively, from 2001 levels.

Alternative D results in the highest emission increases over base year conditions of any of the alternatives, although the increases for most of the pollutants are only slightly higher than alternatives A, C, and E. For example, compared to Alternative A, emissions of most pollutants under Alternative D are projected to increase by relatively small amounts: 2 tons of NO_x and 31 tons of CO. The biggest difference in 2020 emissions under Alternative D compared to Alternative A is PM_{10} emissions, which are projected to increase by 336 tons (44%) primarily because of additional salable and locatable minerals development.

The air quality impacts resulting from emissions under Alternative D should, therefore, be very similar to the impacts from emissions under Alternative A. It is likely that emissions from Alternative D would not contribute to an exceedance of NAAQs or WAAQs due to the generally good air quality currently existing in the region. In addition, given the moderate level of emission increases that will be spread over relatively large distances under Alternative D, this alternative is not expected to cause adverse impacts to AQRVs in nearby NWAs. Implementing the mitigation identified for Alternative A also would reduce emissions and air quality impacts associated with Alternative D.

Alternative E (Preferred Alternative)

Figure 4-2 shows that Alternative E would result in moderately increased emission levels for all pollutants by 2020, compared to existing conditions in year 2001. The most substantial increases are projected to be CO, VOC, and HAPs emissions, with an increase of 1,348 tons (133%), 1,962 tons (69%), and 231 tons (79%), respectively, from 2001 levels.

Alternative E results in emission increases in 2020 over base year conditions that are very comparable to Alternative A. For example, compared to Alternative A, emissions of most pollutants under Alternative E are projected to decrease by relatively small amounts: 1 ton of NO_x and 32 tons of VOCs. The biggest difference in 2020 emissions under Alternative E compared to Alternative A is PM_{10} emissions, which increase by 124 tons (68%) because of additional salable and locatable minerals development.

The air quality impacts under Alternative E would, therefore, be very similar to the impacts under Alternative A. It is likely that emissions from Alternative E could not contribute to an exceedance of NAAQs or WAAQs due to the generally good air quality currently existing in the region. In addition, given the moderate level of emission increases that will be spread over relatively large distances under Alternative E, this alternative is not expected to result in adverse impacts to AQRVs in the nearby NWAs. Implementing the mitigation identified for Alternative A also would reduce emissions and air quality impacts associated with Alternative E.

4.1.1.3 Conclusion

Alternative B results in the least amount of development and the most land use restrictions; therefore, it is the alternative with the lowest levels of air emissions in 2011 and 2020. Compared to base year emissions, Alternative B results in relatively small increases in some of the pollutants, such as PM_{10} and NO_x, and a substantial decrease in VOC emissions. Therefore, Alternative B is expected to produce no exceedances of ambient air quality standards or adverse impacts on AQRVs in Class I areas.

Alternatives A, C, D, and E result in increases of all pollutants. The emission levels among these alternatives are very similar, except for PM_{10}, which is somewhat higher for Alternative D due to increased development of salable and locatable minerals. Because new or expanded individual development projects are likely to be widely separated throughout the planning area and current measured air quality concentrations are well below federal and Wyoming standards, it is unlikely projected increased emissions will contribute to an exceedance of a national or state ambient air quality standard.

4.1.2 Geologic Resources

Management actions for geologic resources address preserving unique geologic features within the planning area and reducing potential risks from known geologic hazards. The Alcova Fossil Area and the Pterodactyl Tracks Area are unique geologic features proposed for protection under certain alternatives. A discussion of associated impacts is found in the Heritage and Visual Resources section of this chapter.

Activities in known geologic hazard areas are restricted on the public surface or federal mineral estate. The BLM addresses the management challenges associated with geologic hazards via the environmental analysis process for individual project proposals. When appropriate, the Casper Field Office develops mitigation measures to avoid and minimize impacts associated with geologic hazards. Although abandoned mines are classified as a geologic hazard, they are discussed in the Health and Safety section later on in this chapter.

4.1.3 Soil

Stable and productive soil in the planning area provides the foundation for other resources (e.g., biological resources) and for resource uses (e.g., livestock grazing). Actions that disturb or compact soil, disrupt soil stability, or reduce soil productivity are considered adverse impacts. Conversely, beneficial impacts to soil include actions that stabilize soil or increase soil productivity. In addition, those actions that avoid or minimize soil compaction or erosion are beneficial.

Most allowable uses have the potential to affect soil resources to some degree. Appendix M provides projected surface disturbance resulting from all RFAs. The BLM action likely to cause the greatest amount of short-term disturbance would be ignited prescribed fire. Developing coal resources would produce the greatest amount of long-term disturbance resulting from a BLM action. Surface-disturbing actions would result in removal of vegetative cover, soil compaction, reduced infiltration, changes in physical and biological properties, and reduction in organic matter content. These direct impacts to soils tend to result primarily from removing the vegetative cover, loosening the surface soil, formation of compacted layers, and increasing the potential for accelerated erosion by exposing soil particles to wind and water. There also would be a loss of soil productivity through disruption of natural soil horizons and removal of vegetated acreage for use by roads, well pads, and other facilities.

Indirect impacts caused by disrupting soil stability, increased compaction, and reduced productivity include (1) sedimentation of drainages and perennial water bodies primarily by wind or water erosion, (2) particulate matter affecting air quality through wind erosion, (3) reduced infiltration, (4) an increase in surface water runoff that could cause higher peak streamflows and possibly downstream flooding, and (5) changes in surface water quality caused by exposing soils or bedrock with undesirable chemical characteristics. These indirect impacts would be minimized through implementing BMPs and developing and implementing a Storm Water Pollution Prevention Plan (SWPPP) and erosion and sediment control plans, as required under the Wyoming Pollutant Discharge Elimination System (WYPDES) Construction General Permit for any surface disturbance of more than 1 acre.

Surface uses that may not result in direct surface disturbance, but may affect soil stability through changes in vegetative cover or soil infiltration rates, include grazing by livestock and wildlife (if improper grazing damages vegetative cover), vegetative treatments, OHV use (especially cross-country travel), and fire and fuels management. Operating motorized vehicles on moist soils, especially heavy equipment, is likely to cause compaction of the surface layer, which may decrease infiltration and aeration, which can reduce soil productivity by making it more difficult for plant roots to grow and obtain soil moisture and nutrients.

Short-term impacts to soils are those that result during initial surface disturbance, prior to completion of revegetation or the installation of other practices that minimize wind and water erosion. The amount of bare ground predicted under each alternative after successful reclamation of disturbed areas is important to consider when evaluating long-term impacts to soils. Areas not reclaimed leaving bareground include roads and areas around facilities that sustain concentrated surface uses by equipment or animals, which preclude the re-establishment of vegetation. Long-term impacts due to accelerated erosion would occur in locations where bare soils are allowed to remain exposed to wind and water for more than 5 years. Other long-term impacts to soils include the loss of productivity in areas where facilities and structures are built by removing or greatly altering the soil profile. Refer to Map 4 for soil resources.

4.1.3.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Approximately 45,156 acres of federal surface have no detailed soils data and have been excluded from the analysis. No determination on erodibility in these areas could be made.
- No soil erosion modeling has been conducted.
- Bare soil (without vegetation or other surface cover) with a surface layer that has been altered from its natural condition is more susceptible to accelerated wind and water erosion than undisturbed soil.
- Implementing standards for healthy rangelands (BLM 1998b) improves vegetation health, vigor, cover, and litter, as well as minimize erosion rates in most areas.
- Proposed surface disturbance under each alternative potentially modify soils by disrupting soil stability, changing vegetative cover, decreasing productivity, and increasing compaction. If these modifications occur on highly erodible soils, the potential for accelerated erosion is approximately 40-percent greater (USFS 2004) than predicted for less erodible soils.
- Most soils with a high water-erosion potential within the planning area correlate with steep slopes (greater than 15%).
- Installing and maintaining erosion controls and other mitigation measures, such as BMPs, results in a substantial reduction in soil erosion, ranging between 40 and 97 percent depending on site conditions (USFS 2003c). However, these measures may not reduce adverse impacts on soil compaction and productivity.
- To be effective on highly erodible soils, more extensive BMPs than those in common use are required to be installed and aggressively maintained. The risk of BMP failure is greater on highly erodible soils.
- Disturbance on highly erosive soils is distributed across the landscape in the same proportion these soils occur on the land unless a proposed management action specifies additional protective measures. In other words, if 5 percent of the soils in the planning area are highly erosive, then it is assumed that 5 percent of the projected total disturbance would occur on highly erosive soils. In general for the planning area, 5 percent of the soils have high water-erosion potential and 4 percent of the soils have high wind-erosion potential.
- Disposal of produced waters by land application, such as irrigation, is not permitted on BLM surface (BLM 2005d).

4.1.3.2 Analysis of Alternatives

The types of impacts that are projected to occur to soils as a result of the various alternatives are similar; however, the intensity of the impacts is anticipated to vary by specific allowable uses and management actions associated with individual alternatives, as described below. The following sections describe the anticipated impacts to soils from individual alternatives by categories anticipated to have a measurable difference among alternatives: surface-disturbing activities, OHV use, fire management and ecology, and proactive management actions.

Impacts Common to All Alternatives

Soils on BLM-administered surface lands and mineral estate have the potential to be disturbed under each alternative by activities proposed across a variety of resource programs. Appendix M lists projected

surface disturbance by alternative over the life of this plan. Table 4-3 contains the estimated acres of highly erosive soils that may be impacted by each alternative.

Table 4-3. Estimated Acres of Highly Erosive Soils That May be Impacted by Each Alternative

	Alternative A		Alternative B		Alternative C		Alternative D		Alternative E (Preferred Alternative)	
	Water	Wind	Water	Wind	Water	Wind	Water	Wind	Water	Wind
Potential impact to highly erosive soils (acres) from BLM Actions	1,054	843	0	0	1,018	814	1,104	883	1,084	867
Potential impact to highly erosive soils (acres) from Non-BLM Actions	2,021	1,617	2,021	1,617	2,021	1,617	2,021	1,617	2,021	1,617
Potential impact to highly erosive soils (acres) from All Actions	3,075	2,460	2,021	1,617	3,039	2,431	3,125	2,500	3,105	2,484

Assumptions for Non-BLM Actions:

BLM Surface = 16% (1,361,577); Non-BLM = 84% (7,159,770)

BLM Minerals = 55% (4,657,172; Non-BLM = 45% (3,864,175), except coal was developed from actual non-BLM mineral ownership.

Assumed the same amount of development would occur on Non-BLM surface and Non-BLM minerals.

Alternative A

Surface-disturbing Activities. Surface-disturbing activities on public land under Alternative A are evaluated on a case-by-case basis. Authorizations prescribe mitigation that reduces impacts to soils from the proposed action. Standard BMPs and mitigation guidelines combined with the restriction on development on slopes greater than 25 percent generally are effective in mitigating impacts to soil and water resources under normal conditions.

Under Alternative A, the projected short-term disturbance from BLM actions would impact 59,990 acres. Following reclamation of disturbed sites, approximately 21,087 acres are anticipated to be impacted in the long term from BLM actions under Alternative A (see Appendix M). Under Alternative A, it is estimated that approximately 1,054 acres of soils with high water-erosion potential and 843 acres of soils with high wind-erosion potential may be impacted by BLM actions (see Table 4-3). The lack of special management actions relating to highly erodible soils under this alternative may result in accelerated erosion in some areas.

Surface Use Activities. Most of the planning area is open to livestock grazing. Application of Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management (BLM 1998b) generally are effective in managing the impacts to soils from domestic livestock grazing. Adjustments to grazing authorizations are made on a case-by-case basis when site specific studies indicate changes in management are required.

The majority of the planning area is designated as being limited to existing roads and trails for OHV use; however, off-road or other inappropriate use of these vehicles can cause undue environmental degradation and accelerated soil erosion. Accelerated erosion resulting from OHV use has not been quantified, but generally is constrained to isolated incidences throughout the planning area.

Prescribed fire is used in accordance with treatments identified by the range, wildlife, and forestry program. Mitigation measures incorporated into the fire prescription generally are effective at controlling accelerated soil erosion. Rehabilitation of wildland fire is conducted on a case-by-case basis. The rate of revegetation on burned areas can vary significantly as a result of environmental and site conditions, but,

in general, most burned areas have successfully revegetated and are not contributing to accelerated soil erosion.

Proactive Management Actions. Existing management actions intended to protect soils include modifying surface-disturbing activities, implementing timing restrictions, and prohibiting surface disturbance in selected areas to reduce erosion based on site-specific evaluations. Surface-disturbing activities on highly erosive soils would be evaluated on a case-by-case basis, as would the requirement for implementing BMPs, establishing temporary surface treatments, and monitoring reclamation success.

Alternative B

Surface-disturbing Activities. Under this alternative, projected short-term disturbance from BLM actions would impact 36,650 acres, the least of any alternative. Following reclamation of disturbed sites, the projected long-term disturbance acreage would be 11,565 acres (see Appendix M). The projected long-term disturbance acreage for Alternative B is approximately 45-percent less when compared to Alternative A. Reducing total surface disturbance by as much as 45 percent will have a beneficial impact on soil erosion and long-term soil productivity.

Alternative B stipulates no surface occupancy (NSO) on identified highly erosive soils. This management action will protect approximately 1,800 more acres of the most erosive and difficult soils to reclaim than any other alternative.

Surface Use Activities. Most of the planning area would remain open to livestock grazing under this alternative. In addition to the application of Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management, forage utilization will be limited to 40 percent of the current year's production (BLM 1998b). Management actions limiting forage utilization by livestock generally should result in more surface cover and reduce erosion. However, utilization of forage by wildlife is not controlled by BLM and will continue even after livestock are removed, so the actual increase in surface cover is uncertain for any given area.

Alternative B proposes the largest area closed to OHV use (26,027 acres) and the smallest area limited to existing roads and trails for OHV use (909,651 acres). Alternative B also designates the largest area (425,657 acres) limited to designated roads and trails for OHV use. Additional restrictions on OHV use would help to limit the impacts to soils.

Alternative B would limit use of heavy equipment for fire suppression to existing roads and trails or immediately adjacent to them, as well as prohibit the use of prescribed fire on highly erosive soils. Prescribed fire is projected to cause the greatest amount of short-term disturbance of all BLM actions (see Appendix M), so additional restrictions on fire operations have the potential to provide long-term beneficial impacts to soil resources.

Proactive Management Actions. Of all the alternatives, the management prescriptions on public lands under Alternative B are the most protective of soil resources. Proactive management actions under this alternative include long-term surface disturbance limited to 80 acres per square mile, a requirement for temporary protective surface treatments on all disturbed areas within 30 days, completion of all reclamation activities within one growing season, closure and reclamation of unused and unnecessary roads and trails, reseeding if less than 50 percent of the predisturbance vegetative cover has been established after 3 years and reseeding if less than 80 percent of the predisturbance vegetative cover has been established after 5 years, use of certified weed-free seed, and full topsoil salvage and segregation. Applying proactive management actions under this alternative will provide the most beneficial impacts to soils of any alternative.

Alternative C

Surface-disturbing Activities. Under Alternative C, the potential for adverse impacts to soils through reduced stability and productivity and increased compaction would be slightly greater than, but similar, to that described for Alternative A. The projected long-term disturbance acreage (20,358 acres) from BLM actions under Alternative C would be within approximately 3 percent of disturbance acreage predicted for Alternative A (see Appendix M).

The NSO on highly erosive soils is not applied under this alternative. Approximately 1,018 acres of erodible soils highly susceptible to water erosion and 814 acres highly susceptible to wind erosion (refer back to Table 4-3) on public lands within the planning area have the potential to be disturbed under Alternative C.

Surface Use Activities. In addition to the application of Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management, forage utilization will be set for allotments with a high percentage of highly erosive soils, providing beneficial impacts to soil resources (BLM 1998b). Impacts to soils from OHV use and fire will be similar to those described under alternative B.

Proactive Management Actions. Under Alternative C, proactive management actions anticipated to avoid, reduce, or minimize adverse impacts to the soils resource would be similar to Alternative B and more beneficial to soils relative to Alternative A. In general, the same types of proactive management actions would be employed, but longer amounts of time would be allowed to reach objectives.

Alternative D

Surface-disturbing Activities. Under Alternative D, the projected long-term disturbance of acreage (22,080) from BLM actions following reclamation is the most of any alternative (see Appendix M). The projected long-term disturbance acreage for Alternative D is approximately 5-percent higher compared to Alternative A and 91-percent higher than Alternative B (Appendix M).

Approximately 1,104 acres of erodible soils highly susceptible to water erosion and 883 acres highly susceptible to wind erosion (refer back to Table 4-3) on public lands within the planning area and have the potential to be disturbed under Alternative D.

Surface Use Activities. Impacts to soils from livestock grazing under this alternative would be similar to those described under Alternative A. Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management (BLM 1998b) would be utilized to protect and improve rangeland health, which would produce beneficial impacts to soil resources.

Alternative D predicts approximately 2,661 acres closed to OHV use, 1,292,630 acres limited to existing roads and trails for OHV use, and 66,001 acres (the second lowest of all alternatives) limited to designated roads and trails for OHV use.

Alternative D would use full protection strategies and tactics across the entire planning area. Alternative D would employ similar fire management as described for current management (Alternative A), except grading of roads would not be allowed. Without special management actions for highly erosive soils or interim reclamation, adverse impacts to soils would be anticipated.

Proactive Management Actions. Proactive management actions to conserve soil under Alternative D would be limited to standard mitigation measures and similar to current management. The lack of proactive mitigation for highly erosive soils and quantitative reclamation standards would likely result in adverse impacts to soil resources.

Alternative E (Preferred Alternative)

Surface-disturbing Activities. The projected long-term disturbance acreage (21,672 acres) from BLM actions under Alternative E is within approximately 3 percent of disturbance acreage predicted for Alternative A (see Appendix M).

Approximately 1,084 acres of erodible soils highly susceptible to water erosion and 867 acres highly susceptible to wind erosion on public lands within the planning area and have the potential to be disturbed (refer back to Table 4-3).

Surface Use Activities. Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management (BLM 1998b) would be utilized to protect and improve rangeland health, which will produce beneficial impacts to soil resources. All livestock grazing allotments will be managed to prevent downward trend in rangeland health, and increases or decreases in forage allocations will be based on monitoring data. Beneficial impacts to soil resources would result from the proposed management actions under this alternative.

Alternative E designates approximately 2,224 acres closed to OHV use, 1,162,244 acres limited to existing roads and trails for OHV use, and 196,824 acres limited to designated roads and trails for OHV use. These designations will control the growth of new trails and minimize adverse soil impacts.

Alternative E restricts fire suppression tactics similar to Alternative B. Prescribed fire will be limited on highly erosive soils, and all fires will be evaluated for rehabilitation. Management actions under this alternative will minimize adverse affects to soil resources from the use of prescribed fire.

Proactive Management Actions. Under Alternative E, proactive management actions anticipated to avoid, reduce, or minimize adverse impacts to soils would be similar to alternatives B and C. An effort would be made under Alternative E to minimize the disturbance to all highly erosive soils by relocating proposed surface-disturbing activities and restricting the use of prescribed fire in areas of highly erodible soils, when practicable. Limitations on total long-term surface disturbance and strict requirements for reclamation of disturbed soils would minimize erosion on all soils, not just the highly erodible soils.

4.1.3.3 Conclusion

Allowable uses and management actions described in this section for the various alternatives were used to determine the potential impacts to soil resources. Meaningful differences in long-term disturbance acreage, livestock management actions, areas open, closed, and limited to OHV use, fire suppression tactics, NSO on steep slopes and highly erosive soils, and reclamation requirements form the basis for the following conclusion. Alternative B is anticipated to produce the least potential adverse impact to soil resources because management actions are anticipated to result in less soil disturbance and potential soil compaction. Therefore, Alternative B is anticipated to conserve more soil resources. Alternatives A, C, and E are similar and are anticipated to produce more soil compaction and erosion relative to Alternative B, but result in somewhat less adverse impacts to soil resources than Alternative D. The alternatives listed in ascending order from the least potential adverse to the most potential adverse impact on soil resources are Alternative B, alternatives A, C, and E, followed by Alternative D. Alternative D includes the least restrictive and protective measures for soils of all alternatives.

4.1.4 Water

This section described impacts to surface water quality, surface water quantity, and groundwater quality and quantity. For this analysis, short-term impacts include those actions that degrade surface water quality, change surface water flows, or change groundwater quality and quantity as a result of unstable

soils or poor watershed condition until revegetation or other reclamation can be established (up to 5 years).

Surface Water Quality

Direct impacts to surface water quality result from activities that degrade the ambient water quality of surface waters in the planning area. Indirect impacts include actions that disturb soil, especially highly erodible soil. Indirect impacts to surface water quality also may result from activities that modify drainages in the planning area. For example, actions that change the number of road-stream crossings or the distribution and condition of wetlands and riparian areas, would indirectly result in changes to surface water quality. Wetlands and riparian areas filter pollutants contained in runoff before they enter the stream system.

Beneficial impacts to surface water quality consist of those actions that minimize, reduce, or prevent offsite erosion or the discharge of supplemental water that is of lower quality than the ambient water quality of the receiving water. An adverse impact to water quality is any action resulting in a violation of state water quality standards or negatively impacts a designated beneficial use. Surface-disturbing activities (Appendix M) that contribute to offsite erosion and sediment delivery also are considered direct adverse impacts.

Long-term impacts to surface water quality are those that result from long-term (more than 5 years) bare ground or established point discharges that increase sediment loads or degrade water quality.

Surface Water Quantity

Impacts to surface water quantity include those that reduce or supplement streamflows, and may either be beneficial or adverse, depending on the quantity and the location of the withdrawal(s) and (or) discharge(s).

Direct impacts to surface water quantity result from activities, watershed conditions, or treatments (including vegetative and physical treatments, impoundments, retention and detention structures, etc.) that increase or decrease runoff, as well as from changes in the quantity of produced water discharged into the system. Direct impacts also can be the result of adding or modifying withdrawals from the drainage system. Indirect impacts to surface water quantity result from activities that modify the capacity of stream channels or result in changes to the amount of water reaching the stream system. For example, changes in the locations of roads that direct surface water runoff into drainages may increase or decrease the timing and amount of surface water flowing in the stream system. The distribution and condition of wetlands and riparian areas would indirectly result in changes to surface water quantity because they increase infiltration and delay peak flows.

Long-term impacts to surface water quantity are those that result from long-term facilities that increase impervious surface or changes to established discharges that alter supplemental streamflows (more than 5 years).

Groundwater Quality and Quantity

Direct impacts to groundwater quality and quantity could result from changes in the number of wells—including water supply, water disposal, oil and gas wells, and in-situ uranium mining wells—drilled, the number of springs developed, water conservation efforts, and the amount of surface water that infiltrates the ground before flowing to the surface water system. Indirect impacts to groundwater quality and quantity result from activities that modify the areas or sources that recharge the groundwater system. For example, activities that decrease vegetative cover or increase runoff would reduce the infiltration of precipitation and reduce groundwater recharge.

Long-term impacts to groundwater quality and quantity are those that result from permanent facilities or landscape alterations that modify groundwater recharge, including wells that deplete the aquifer through extraction, facilities that are paved to eliminate surface water infiltration, or wells that are used to inject water (disposal wells) into the groundwater system.

4.1.4.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Surface disturbance (Appendix M) can affect surface water quality mainly by increasing sediment delivery to drainages, which is then ultimately transported to streams during runoff events. Surface disturbance of highly erosive soils is the most likely disturbance to increase sedimentation in streams.
- The major watersheds (2nd-level, 4-digit hydrologic units) projected to contain the greatest acreage of moderate to high densities of oil and gas wells listed in decreasing order of projected well density are: Big Horn River (24 percent of the watershed within the planning area, or approximately 81,000 acres), Powder River (6% or approximately 70,000 acres), Cheyenne River (less than 2% or less than 19,000 acres), and North Platte River (less than 2% or less than 93,000 acres). The total acreage for all four watersheds is approximately 263,000 acres, or less than 6 percent of the 4.6-million acres of federal mineral estate in the planning area.
- Soils that are the most susceptible to erosion are the most likely to adversely impact surface water quality if disturbed, primarily because these soils are difficult to protect through the implementation of standard BMPs. For this analysis, the acres of highly erodible soils in each 2nd-level hydrologic unit protected by major constraints (NSO or no surface disturbance) and those closed to oil and gas development are used as an indicator of the relative amount of impact on surface water quality. These constraints were applied in a Geographic Information System (GIS) using areas designated for major constraints and apply to all surface-disturbing activities under consideration.
- The impacts of special designations on water quality and quantity are considered through application of constraints within these areas.
- Erosion contributes to sedimentation if it results in sediment delivery to the surface water drainage system. The amount of sedimentation is determined by the amount of erosion and effectiveness of BMPs applied to minimize erosion caused by surface-disturbing activities, as well as by the buffering capacity of the land over which the water flows before reaching a drainage.
- The extent of unsurfaced roads (i.e., those without gravel or any other added surface material) is an indicator of the quantity of sediment delivery that may impact surface water quality within each watershed (Furniss et al. 2000).
- Produced water generated from oil and gas development adds to surface water flows and can supplement streamflows. It is assumed legal water rights are established according to the requirements of the state engineer if livestock producers or other land users choose to utilize this water. On BLM-administered surface lands, produced water is not discharged by land application disposal (LAD) methods, such as irrigation (BLM 2005d).
- Mineral development is the primary activity with a potential to impact shallow groundwater quality and quantity. Locations in the planning area with depths to groundwater of less than 100 feet are considered the most likely to be impacted by mineral development. The shallower the depth to water, the more sensitive an aquifer is to contamination (Wyoming Geographic Information Science Center 1998).

4.1.4.2 Analysis of Alternatives

The following analysis focuses on potential short-term and long-term impacts to surface water and groundwater quality and quantity projected as a result of allowable uses and management actions proposed under each alternative. The proposed management of the following resource programs have the potential to affect (beneficially or adversely) water resources: cultural resources, fire management, fish and wildlife, special status species, forestry, INPS, minerals (including oil and gas), National Historic and Other Historic Trails (NHTs), OHV use, paleontology, rangeland and livestock grazing, recreation, soils, Special Management Areas (SMAs), transportation, and vegetation. Refer to Map 5 for Water resources.

Impacts Common to All Alternatives

Based on the definitions, methods, and assumptions described above, the potential impacts of each alternative are described below. The following analysis of alternatives is organized according to the impacts of activities associated with each alternative. Impacts common to all alternatives are not repeated in the analysis of individual alternatives.

Surface Water Quality

Actions that remove vegetation and loosen the surface soil have the potential to cause soil erosion and sedimentation in the surface water system. Eroded soil that reaches surface water channels is a primary source of impaired surface water quality. The amount of sediment delivered to a stream depends on many factors (e.g., slope length and gradient, vegetative cover and type, and density of the drainage network), all of which can result in deposition of the sediment before it reaches a drainage (also called buffering).

Roads intercept surface water runoff on the landscape and often direct flows to drainages through ditches and culverts. If roads are unsurfaced, runoff flowing down a road often picks up sediment that is then deposited in the surface water system at stream crossings or at culverts and water bars. Alternatives that increase the density of roads in a watershed, especially unsurfaced roads, would likely increase sedimentation. Roads also may act as conduits for directing contaminants from vehicles and resource management activities (e.g., pesticide applications) into the surface water system (Furniss et al. 2000).

Surface disturbance from alternatives described in Chapter 2 is most likely a result from mineral development, vegetation treatments, pit and reservoir construction, concentrated OHV use, road construction, and pipeline and powerline corridor construction. Other activities that could remove vegetation and loosen soil, increasing the potential for offsite erosion and sediment delivery into the stream system, include trail construction and maintenance, road maintenance, concentrated livestock and native ungulate grazing, fire management, and the reclamation of disturbed areas. Those watersheds with the greatest proportion of highly erodible soils have the most potential for contributing sediment to the surface water system with the presence of surface-disturbing activities. These watersheds include the main stems and tributaries of the South Fork of the Powder River, the Cheyenne River, Salt Creek, and the North Platte River. Under all alternatives, sedimentation within watersheds would be minimized through the implementation, inspection, and maintenance of BMPs and the development and implementation of SWPPPs and erosion and sediment control plans, as required under the WYPDES Storm Water Program. Water management plans for surface discharges of produced water would include reclamation strategies and mitigation, monitoring to track changes in receiving channels, and minimizing adverse impacts to watershed health. Monitoring rangeland condition is used to determine what grazing management actions are needed to minimize the amount of erosion that could affect surface water quality. WYPDES permits required by the State of Wyoming would regulate water quality changes (BLM 2004f).

BLM water monitoring activities are carried out primarily in support of specific management activities. This monitoring is used to measure the presence and magnitude of impacts (both positive and negative), the effectiveness of mitigation measures, and as a mechanism to drive adaptive management. The

Wyoming DEQ has an ongoing monitoring program (Wyoming DEQ 2004b) designed to (1) determine the overall quality of the waters of the state, (2) determine the extent of water quality changes over time, (3) identify problem areas and areas in need of protection, and (4) determine the effectiveness of existing clean water programs. The monitoring done by the BLM generally is more intensive and site-specific (tied to specific actions) than that which is carried out by the Wyoming DEQ; however, the two programs can be, and are, complementary.

Surface discharges of produced water from oil and gas wells (including CBNG wells) are permitted by Wyoming DEQ through a WYPDES permit that requires compliance with specific water quality standards. These surface discharges have been authorized in the North Platte River, Cheyenne River, and Powder River watersheds. The produced water quality discharged on the surface must be suitable for beneficial uses, such as agricultural and livestock, and cannot result in a violation of water quality standards in the receiving stream. In general within the planning area, the volume of produced water from CBNG wells is greater than with conventional natural gas development (however, not greater than that associated with the production of oil). The coalbed zones that are currently being developed in the planning area contain water that is of relatively high quality. Produced water from oil and gas wells in the vicinity of Midwest, Wyoming has much higher salinity than that from CBNG wells in the planning area because it is derived from aquifers that are typically more saline than the Wasatch/Fort Union formations associated with CBNG. Adverse impacts on surface water quality from oil and gas (including CBNG) development will be minimized under all alternatives by following standard practices, BMPs, and Guidelines for Surface-disturbing activities (Appendix K).

Surface Water Quantity

When watersheds lack vegetation (especially grasses, forbs, and residual litter), surface infiltration into the soil decreases, causing more runoff to reach the stream system. Conversely, activities such as reclamation can improve vegetative cover and would have a beneficial impact. As surface disturbance increases, so does the amount of bare ground, compacted soils, and possibly less-pervious areas in a watershed. As a result, more surface water runoff reaches streams in a shorter period of time, which increases the potential for sedimentation and the frequency of flooding or erosive velocities from high flows in channels. Healthy vegetative cover increases infiltration of surface water flows, filters out sediment before it reaches drainages, reduces runoff, and lowers peak flows in the surface water system. Concentrated grazing by livestock and wildlife may contribute to soil compaction and damage to the vegetative cover and soil crust, thus increasing surface water runoff, erosion, and sedimentation.

Produced water from oil and gas wells (including CBNG wells) is sometimes discharged to surface waters, thereby contributing to surface water flows. In general, most (approximately 80%) of the surface discharge supplements local surface water flows when present, with the balance lost to infiltration or evapotranspiration (BLM 2003f). The percentage would change if other disposal methods were utilized (e.g., containment, enhanced infiltration, re-injection). Surface water modeling conducted for the *Final Environmental Impact Statement and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project* (BLM 2003f) calculated discharge increases from produced water in major tributaries in CBNG development areas ranging between 7 and 15 cubic feet per second (cfs). Average annual streamflows in the Powder River range from 15 to 270 cfs, while average annual streamflows in major tributaries range from 1 to 44 cfs (USGS 2005a). The area modeled included that portion of the Powder River Basin within the planning area. The number and density of wells modeled for the *Final Environmental Impact Statement and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project* (BLM 2003f) is much greater (two orders of magnitude or more) than that projected within the planning area. In addition, the Powder River modeling effort included surface application through irrigation, which would not occur on BLM-administered land in the planning area. The volume of surface water discharge and the channel capacity of the receiving stream would determine the change, if any, to stream characteristics.

Groundwater Quality and Quantity

Potential sources of groundwater contamination may come from point sources, such as chemical spills, chemical storage tanks (above ground and underground), industrial sites, landfills, oil and gas well sites (including reserve pits), oil and gas (including CBNG) detention and retention ponds, and mining activities (e.g., in-situ uranium development). Other possible sources of groundwater contamination may come from nonpoint sources, such as household septic tanks, roadways, and agricultural activities. Groundwater quality is most susceptible to pollution where the aquifer is shallow because there is less opportunity for filtering by the soil and bedrock. Produced water with high salinity levels would not be considered for surface discharge (unless treated first) and most likely would be re-injected.

A portion of the water in aquifers associated with coal seams would be extracted as produced water during development of CBNG wells and a portion of the aquifers associated with the coal seams would actually be extracted by coal mining. Most of the produced water would likely be returned to shallow aquifers from the surface water drainage system through infiltration or groundwater injection. Produced water would have the greatest potential to affect groundwater quality and quantity where the oil and gas (including CBNG) wells are in areas with shallow depth to groundwater. These areas include the western part of the planning area in Natrona County south of U.S. Highway 20-26 and north of Douglas in Converse County within the Powder River Basin (Wyoming Geographic Information Science Center 1998).

Alternative A

Surface Water Quality

Over the long term, it is projected that BLM actions under Alternative A would disturb 21,087 acres. Under Alternative A, more than 4.6-million acres would be open to mineral leasing and development; however, most development is projected for the Wind River Basin, which contains few Class 2 (and no Class 1) streams. Approximately 575,778 acres of highly erodible soils could be disturbed due to oil and gas development.

Other proposed activities that would result in surface disturbance and could, therefore, contribute sedimentation include the mining of coal, salable, and locatable minerals; the development of wind-energy sites; construction of reservoirs, pits, or wells for wildlife and livestock use; and vegetation treatments. In addition, Alternative A has the largest area (1,311,715 acres) designated as limited to existing roads and trails for OHV use; this area includes highly erodible soils. Without limits on the disturbance of these soils, OHV use could contribute sedimentation to surface water bodies. Structures related to road and trail construction could intercept surface water runoff and divert sediment to the stream systems. Approximately 10 percent of the grazing allotments would be evaluated each year to determine whether they meet the standards for healthy rangelands. Those allotments that meet the standards for healthy rangelands do not adversely impact water quality. Those allotments that do not meet the standards would be identified through monitoring and guidelines would be implemented to bring the allotment into conformance. Table 4-4 compares the acreage of highly erodible soils susceptible to water erosion that potentially would be impacted and likely to adversely impact surface water quality.

Table 4-4. Estimated Acres of Soils with a High Potential for Water Erosion by Alternative

Actions	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
BLM Actions	1,054	0	1,018	1,104	1,084
Non-BLM Actions	2,021	2,021	2,021	2,021	2,021
All Actions	3,075	2,021	3,039	3,125	3,105

Source: Meyer 2006
BLM Bureau of Land Management

Surface Water Quantity

Because Alternative A would contain fewer limits on activities that could result in soil compaction and vegetation removal, it is anticipated to increase surface water flows throughout the planning area. Alternative A is projected to have the highest number of oil and gas (including CBNG) wells drilled relative to other alternatives; however, impacts associated with produced water from these wells is expected to be relatively minor and localized. For comparison purposes, the amount of water projected and the number of CBNG wells drilled under Alternative A are both expected to be substantially less (more than two orders of magnitude) than corresponding numbers projected in the *Powder River Basin Oil and Gas EIS Surface Water Modeling Technical Report* (BLM 2002c).

Groundwater Quality and Quantity

Alternative A would have the greatest potential for soil compaction, vegetation disruption, and road construction, all of which would reduce the amount of precipitation that infiltrates the ground to recharge shallow and deep aquifers. Pitless technology for drilling operations most likely would not be prevalent, so the opportunity for contaminants to enter the groundwater would be the highest under this alternative. However, the potential for contaminants to enter the groundwater is quite low due to the regulation by the Wyoming Oil and Gas Conservation Commission (WOGCC) and site-specific analyses done at the time of permitting. Alternative A would have the highest number of oil and gas (including CBNG) wells drilled, so the potential for adverse impacts on groundwater quality within the areas with shallow depth to groundwater is also the highest. However, the relatively low density of CBNG wells combined with the fairly high quality of produced water in the planning area is not expected to result in adverse impacts to groundwater quality. In addition, with the highest number of wells being drilled under this alternative, the potential of impacts to groundwater quantity (associated with CBNG extraction) also would be the highest.

Alternative B

Surface Water Quality

Alternative B projects the least long-term surface disturbance (11,565 acres) over the long term relative to other alternatives. Alternative B initially would involve surface disturbance to reclaim unnecessary roads, but this would improve long-term watershed health and eventually reduce sedimentation from roads. Compared to Alternative A, there would be fewer opportunities for surface-disturbing actions, including oil and gas development, vegetation treatment, and more areas designated as NSO and controlled surface use (CSU) along perennial streams, riparian areas, and water bodies. Under Alternative B, no highly erodible soils could be disturbed (NSO) on BLM-administered land.

The use of prescribed fire on highly erosive soils would be prohibited under Alternative B, which would provide limitations on damage to vegetative cover, thus minimizing erosion and reducing sedimentation in surface water bodies. The stringent requirements to revegetate all disturbed areas within one growing

season would re-establish soil cover more quickly than under Alternative A and result in fewer opportunities for soil erosion and sedimentation. Other restrictions on surface disturbance proposed under Alternative B include establishing larger areas that limit the extraction of minerals around bald eagle roost sites and limiting OHV access to designated roads and trails and minimizing stream crossings.

As shown in Table 4-3, Alternative B would provide the greatest protection of highly erodible soils of all alternatives. This protection would result in the fewest adverse impacts to water quality, especially in the high quality streams.

Surface Water Quantity

With the fewest projected number of oil and gas (including CBNG) wells, Alternative B is projected to result in the least amount of change to surface water quantity. Quantities of produced water from CBNG wells are anticipated to be negligible in the planning area.

Groundwater Quality and Quantity

Alternative B would have the least potential for oil and gas development, soil compaction, and vegetation disturbance of any alternative. Rehabilitation of well and spring developments would result in the extraction of additional groundwater not previously available, but the potential impacts to groundwater quantity would be minimized through the use of flow-control devices.

Alternative C

Surface Water Quality

Alternative C, as shown in Table 4-3, would provide greater protection of highly erodible soils than under Alternative A, and less than under Alternative B. This protection would result in fewer adverse impacts to water quality than under the No Action Alternative (Alternative A), including in the high quality streams.

Surface Water Quantity

Alternative C would have similar, but slightly greater impacts to surface water quantity compared to Alternative B, but less than Alternative A. Quantities of produced water from CBNG wells are anticipated to be negligible in the planning area.

Groundwater Quality and Quantity

Alternative C would have similar, but slightly greater, impacts to groundwater quality and quantity than would Alternative B, but less than Alternative A.

Alternative D

Surface Water Quality

Relative to all other alternatives except Alternative A, surface water quality would sustain greater adverse impacts by increased sedimentation and other contaminants under Alternative D. Fewer limits on surface disturbance, more mineral development, less stringent reclamation and revegetation requirements, and no monitoring of disturbed areas to ensure stability under Alternative D would be the causes of surface water impacts. OHV restrictions would be similar to those described under Alternative A, except slightly greater within proposed SMAs, so the potential for surface disturbance and sedimentation would be slightly less under Alternative D than under Alternative A. BLM Wyoming guidance limits off-road travel related to nonpermitted activities to 300 feet under all alternatives.

As shown in Table 4-3, under Alternative D, protection of highly erodible soils would result in fewer adverse impacts to water quality than under Alternative A, but more than under alternatives B, C, or E.

Surface Water Quantity

Alternative D impacts to surface water quantity would be similar to, but slightly less than, those under Alternative A. Alternative D would have the highest number of CBNG wells drilled, with the majority within the Antelope Creek and Dry Fork of the Cheyenne River watershed. Increases in surface water discharge from produced water would be similar to those described under Alternative A, while limits on other management actions would provide for slightly improved protection that might decrease surface water runoff.

Groundwater Quality and Quantity

Overall, Alternative D impacts to groundwater quality and quantity would be similar to, but, slightly less than, those under Alternative A.

Alternative E (Preferred Alternative)

Surface Water Quality

The potential for adverse impacts to surface water quality through reduced soil stability and increased sedimentation and other contaminants in the surface water system under Alternative E would be less than that described under Alternative A, C, or D, but greater than that for Alternative B.

Surface Water Quantity

Alternative E would have similar, but slightly fewer, adverse impacts to surface water quantity compared to Alternative A. Alternative E would contain some limits on activities that could result in soil compaction and vegetation removal. Alternative E is projected to have more CBNG wells drilled (with the majority within the Antelope Creek and Dry Fork of the Cheyenne River watershed) than under Alternative A. Supplemental flows from produced water associated with CBNG wells projected under Alternative E are expected to be negligible relative to surface water quantity in the planning area.

Groundwater Quality and Quantity

Alternative E would have some potential for soil compaction, vegetation disruption, and road construction, all of which would reduce the amount of precipitation that infiltrates the ground to recharge shallow and deep aquifers. Rehabilitation of well and spring developments would result in the extraction of additional groundwater not previously available. Potential impacts to groundwater quantity would be minimized through the use of surface protection of water sources and conservation measures.

4.1.4.3 Conclusion

Allowable uses and management actions described in this section for the various alternatives were used to determine the potential impacts to water resources. Meaningful differences in long-term disturbance acreage, including areas open, closed, and limited to OHV use; acreage of highly erosive soils; number of oil and gas (including CBNG) wells; and produced water discharge form the basis for the following conclusion. Alternative B results in the least adverse impacts to water resources because management actions under this alternative result in the least amount of change to surface water and groundwater quality and quantity. Therefore, Alternative B provides the greatest protection to surface water and groundwater resources. Alternatives A and D are similar in that they are projected to result in similar adverse impacts to surface water and groundwater quality and quantity and result in somewhat more adverse impacts to water resources than Alternative C. Alternative E results in less adverse impacts to surface water quality than Alternative A, slightly fewer adverse impacts on surface water quantity than Alternative A, and similar impacts to Alternative A relative to groundwater quality and quantity. In ascending order from the least adverse to the most adverse impacts on water resources, the alternatives rank as follows: Alternative B, Alternative E, followed by alternatives C, D, and A.

4.2 Mineral Resources

The mineral resources section describes potential impacts from the proposed alternatives to locatable, leasable, and salable minerals within the planning area. Within each resource, methods and assumptions and analysis of alternatives are included.

4.2.1 Locatable

Unlike leasable minerals (e.g., oil and gas or coal) or salable minerals (e.g., sand and gravel), where issuance of a lease or permit is at the BLM's discretion, the discovery and location of a locatable mineral claim is initiated by the mining claimant. The regulations as stated in 43 CFR 3809 manage surface-disturbing activities on mining claims. For exploration activities that will disturb five acres or less, the claimant is required to submit a Notice of Intent (NOI) to the BLM. For exploration involving more than 5 acres, and for actual mining operations regardless of acreage, the claimant must submit a plan of operations (POO) for approval by the BLM before mining operations can begin. These regulations do not apply to lands in the National Park System, National Forest System, and the National Wildlife Refuge System; on acquired lands; or on BLM-administered lands under wilderness review. If a mining claimant's operation is located on lands patented under the Stock Raising Homestead Act and no written surface owner consent exists, then a POO must be submitted for BLM approval. Where the surface owner's consent has been obtained, the claimant does not need to submit an NOI or obtain POO approval.

Actions that could occur through implementing an alternative may have the potential to affect access to locatable minerals. Other types of actions may place or remove restrictions or additional requirements on exploration and development activities. An example of an additional restriction would be a viewshed restriction on development activity that, while not preventing access, requires that development activity be conducted so that it is not readily apparent.

4.2.1.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The potential for occurrence of locatable minerals exists across the planning area.
- About 277,861 acres of the federal mineral estate has a moderate to high potential for the occurrence of uranium. The potential for locatable uranium development activity is high to moderate for the planning period. Most uranium development in the planning area will occur by in-situ mining.
- About 49,980 acres of the federal mineral estate has a moderate to high potential for the occurrence of metallic minerals other than uranium. The potential development activity for these types of locatable metallic minerals is moderate to low for the planning period.
- About 197,836 acres of the federal mineral estate has a moderate to high potential for the occurrence of bentonite. The potential for locatable bentonite development activity is high to moderate for the planning period.
- About 123,389 acres of the federal mineral estate has a moderate to high potential for the occurrence of gypsum. The potential for locatable development activity is low for the planning period.
- About 117,680 acres of the federal mineral estate has a moderate to high potential for the occurrence of limestone. The potential for locatable limestone development activity is moderate to low for the planning period.

- Any alternative that limits locatable mineral development (i.e., reduces the area available for development) will have some adverse impact on the minerals listed above and other potential locatable minerals.
- Restrictions on resource uses apply to the life of the RMP, but can be changed by amending the RMP.
- The 43 CFR 3809 regulations manage surface-disturbing activities on mining claims.
- Withdrawals of less than 10 percent of the high to moderate federal mineral estate are considered minor impacts.

4.2.1.2 Analysis of Alternatives

Allowable uses and management actions with the potential to adversely impact locatable mineral exploration and development activities include management actions that result in areas withdrawn from locatable minerals and other resource restrictions applied to locatable minerals.

Impacts Common to All Alternatives

Restrictions on locatable mineral exploration and development activities have the potential of resulting in adverse impacts when areas are withdrawn, classified, or segregated from locatable mineral entry or other resource restrictions are applied. However, the intensity of impacts is anticipated to vary by alternative. The greater the acreage withdrawn, classified, or segregated, the greater the adverse impact to this resource. Therefore, adverse impacts to locatable minerals from these actions are described under the individual alternatives. NSO, timing limitation stipulation (TLS), and CSU restrictions may add additional limits (mainly by increasing costs) on the ability of claimants to develop these types of locatable minerals, but they are more minor potential adverse impacts.

Alternative A

No more than about 4 percent of the total federal mineral estate is adversely impacted by withdrawals, classifications, or other segregations for uranium, metallic minerals other than uranium, bentonite, gypsum, and limestone. Adverse impacts are considered to be minor for these mineral resources.

Approximately 488,531 acres (about 10%) of the total federal mineral estate are withdrawn from locatable mineral entry in the planning area. These management actions have the potential to result in adverse impacts to those locatable minerals not listed above, by limiting where exploration and development of these minerals may occur.

Alternative B

Only the withdrawal protecting National Historic and other Historic Trails (924,153 acres or 20%) has more than a minor adverse impact for metallic minerals other than uranium. Most withdrawals have an adverse impact of less than 10 percent to the potential uranium, bentonite, gypsum, and limestone resources and, thus would be only minor in affect. Adverse impacts from withdrawals greater than 10 percent of the high to moderate federal mineral estate are:

- Uranium
  - National Historic and other Historic Trails (108,560 acres or 39%).
- Bentonite
  - Fragmentation blocks (507,616 acres or 37 %)
  - National Historic and other Historic Trails (27,687 acres or 14%)

  - South Bighorns/Red Wall Area of Critical Environmental Concern (ACEC) (23,332 acres or 12%)
- Gypsum
  - South Bighorns/Red Wall ACEC (67,421 acres or 55%) and
  - Fragmentation blocks (55,947 acres or 45%)
- Limestone
  - National Historic and other Historic Trails (31,319 acres or 27%)
  - South Bighorns/Red Wall ACEC (16,398 acres or 14%)

Approximately 2,253,132 acres (about 40%) of the total federal mineral estate are withdrawn from locatable mineral entry in the planning area (Map 14). These withdrawals have the potential to result in adverse impacts to those locatable minerals not listed above by limiting where exploration and development of these minerals may occur.

Alternative C

Potential adverse impacts to metallic minerals other than uranium are considered to be minor, since no more than about 1 percent of the potential resource is impacted by any withdrawal. Most withdrawals have less than an adverse impact of 10 percent to the potential uranium, bentonite, gypsum, and limestone resources and, thus, would be only minor in affect. Adverse impacts from withdrawals greater than 10 percent of the high to moderate federal mineral estate are:

- Bentonite
  - South Bighorns/Red Wall SMA (80,128 acres or 41%)
  - Fragmentation blocks (30,703 acres or 16%)
- Gypsum
  - South Bighorns/Red Wall SMA (78,914 acres or 64%)
  - Fragmentation blocks (48,811 acres or 40%)
- Limestone
  - South Bighorns/Red Wall SMA (15,221 acres or 13%)

Approximately 1,314,556 acres (about 28%) of the total federal mineral estate are withdrawn from locatable mineral entry in the planning area (Map 15). These withdrawals have the potential to result in adverse impacts to those locatable minerals not listed above by limiting where exploration and development of these minerals may occur.

Alternative D

No more than about 4 percent of the total federal mineral estate is adversely impacted by withdrawals, classifications, or segregations for uranium, metallic minerals other than uranium, bentonite, gypsum, and limestone. Adverse impacts are considered to be minor for these mineral resources.

Approximately 52,243 acres (about 1%) of the total federal mineral estate are withdrawn from locatable mineral entry in the planning area (Map 16). These management actions have the potential to result in adverse impacts to those locatable minerals not listed above by limiting where exploration and development of these minerals may occur.

Alternative E (Preferred Alternative)

Potential adverse impacts to uranium, metallic minerals other than uranium, bentonite, and limestone minerals are considered to be minor, since no more than about 10 percent of the potential resource could

be impacted by any withdrawal. Most withdrawals have an adverse impact of less than 10 percent to the potential gypsum resource and, thus, would be only minor in affect. The withdrawal of the South Bighorns/Red Wall SMA (53,624 acres or 43%) and fragmentation blocks (45,006 acres or 36%) adversely impacts the potential gypsum resource.

Approximately 578,699 acres (about 12%) of the total federal mineral estate are withdrawn from locatable mineral entry in the planning area (Map 17). These withdrawals have the potential to result in adverse impacts to those locatable minerals not listed above by limiting where exploration and development of these minerals may occur.

4.2.1.3 Conclusion

Management actions may adversely impact the acreage available for exploration and development and how these activities can be conducted. Impacts due to withdrawal from locatable mineral entry with high to moderate mineral development potential are a direct adverse impact. Adverse impacts from withdrawals less than 10 percent of the high to moderate federal mineral estate are minor and impacts greater than 10 percent are substantial.

Impacts from alternatives A and D are similar and minor for uranium, metallic minerals other than uranium, bentonite, gypsum and limestone. Under Alternative E, only impacts to gypsum are considered minor. Under Alternative C, impacts to bentonite, gypsum and limestone are considered substantial. Impacts from Alternative B are substantial for uranium, metallic minerals other than uranium, bentonite, gypsum and limestone.

With respect to other potential locatable minerals not listed above, it should be noted that the location of these potential resource areas are not mapped for this analysis. Therefore, predicting potential adverse impacts due to restrictions identified under each alternative were presented in a general way only.

4.2.2 Leasable – Coal

Prior to offering federal coal reserves for lease, a screening process, as outlined in 43 CFR 3420.1-4, must be completed. The process includes four screens: coal development potential, unsuitability criteria, multiple use conflicts, and surface-owner consultation. The area may be offered for lease only after the screening process has been completed and the area has been determined to be acceptable for further consideration for coal leasing.

Once the coal reserves have been leased, oversight of mining operations passes to the Office of Surface Mining and the Wyoming DEQ, Land Quality Division. Verifying production tonnage and determining maximum economic recovery remain the responsibility of the BLM. The U.S. Forest Service (USFS) is responsible for managing federal surface lands within the coal development potential area (CDPA). Since mining is restricted to those areas that have already undergone the screening process, the impacts to and from other resources have already been or will be evaluated. No BLM surface lands are overlying current coal leases.

Actions that could occur through implementing each alternative have the potential to affect coal resources. This section describes the impacts of each alternative on coal exploration and leasing in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as beneficial or adverse. Direct impacts are the result of actions that either specifically prohibit or permit coal exploration and development. An example of a direct impact would be when an area is identified as unacceptable for further consideration for coal leasing to protect other resources. Indirect impacts are the result of actions that may place or remove restrictions or additional requirements on mineral exploration and development. An example of an indirect impact would be a viewshed restriction on development

activity that, while not preventing development, requires that development activity be conducted so that it is not readily apparent. Short-term impacts are those impacts that occur in less than 5 years. A TLS or other moderate resource restrictions result in short-term impacts. Long-term impacts occur beyond the first 5 years and perhaps for the duration of the management plan. Closures and major restrictions result in long-term impacts.

4.2.2.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The results of the coal screening for lands in Converse County were performed under the Buffalo RMP (BLM 2001a; USFS 2001).
- No additional CDPAs currently are being evaluated as acceptable for further consideration for coal leasing and development.
- While all BLM-administered lands may be considered open for coal exploration, new exploration outside the current CDPA is unlikely during the planning period.
- Coal exploration involves the use of truck-mounted drill rigs and support vehicles to drill shallow core holes. Four core holes per section typically are drilled with more holes drilled where additional detail is required, such as near the edge of the deposit.
- Major restrictions on coal exploration and development include NSO or overlapping TLS restrictions that result in year-round restrictions.
- Moderate restrictions on coal exploration and development include seasonal restrictions and CSU.
- Restrictions from other resources apply to the life of the RMP, but can be changed by amending the RMP.

4.2.2.2 Analysis of Alternatives

As coal exploration and development are affected by the alternatives, coal exploration and development can, in turn, impact other resources. For example, roads built to accommodate development could contribute to habitat fragmentation. The impacts of coal development on other resource topics (e.g., physical, biological, fire management and ecology, etc.) are discussed under the appropriate impacted resource section. Refer to Maps 6 and 7 for coal resources.

Impacts Common to All Alternatives

Oil and gas fields underlie the existing CDPA. The development and production of these oil and gas reserves could impact the timing of coal leasing. Washington Office IM 2003-253, dated August 21, 2003, provides direction on resolving conflicts between surface coal mining and CBNG operations on federal leases. Conflict Administration Zones (CAZs) have been defined in areas where federal oil and gas leases overlie federal coal reserves in the path of projected mining. Conflict resolution is the same under all alternatives.

Under all alternatives, all BLM-administered lands within the planning area are open to coal exploration, a beneficial impact to coal exploration. Coal exploration on federal mineral estate would be subject to the requirements and conditions of the coal exploration license process, which requires project-specific stipulations and conditions designed to limit impacts from exploration on other resources. While all lands may be considered open for exploration, the assumption is that exploration activity would focus on the current CDPA identified in northern Converse County. Therefore, the discussion of impacts from other resource restrictions will focus on northern Converse County. If coal exploration were to occur across the

planning area, the moderate (CSU and TLS) and major (NSO and overlapping TLS) restrictions and restrictive impacts identified in the oil and gas discussion by alternative and shown on the Oil and Gas Maps 8 through 12 would apply to coal exploration activities.

Alternative A

Coal Exploration Impacts

Other Resource Restrictions on Coal Exploration. Under Alternative A, management actions from soils, special status species – wildlife, and special designations would place restrictions on coal exploration in northern Converse County. Major restrictions would apply along the Bozeman Trail west of the Thunder Basin National Grasslands boundary. Major restrictions have the potential of resulting in an adverse impact to coal exploration because NSO is allowed or overlapping TLS restrictions apply. The remainder of the area would be managed with standard or moderate restrictions. Moderate restrictions may limit the time of operation or require specific mitigation, but they do not preclude coal exploration. Impacts to coal exploration from moderate restrictions are adverse, but minor in nature.

Impacts to coal exploration from other resource restrictions under Alternative A are similar to alternatives C, D, and E and less than under Alternative B. Moderate and major restrictions for Alternative A are illustrated on Map 8 for Oil and Gas.

Coal Leasing Impacts

Within the CDPA. Under Alternative A, BLM-administered lands identified in the 2001 Buffalo RMP maintenance action are acceptable for futher consideration for coal leasing. Under this alternative, restrictions from other resources have the potential to impact coal leasing during the reapplication of coal screens; however, only standard or moderate restrictions apply under Alternative A. Impacts to coal leasing from moderate restrictions are adverse, but minor in nature, and include specific mitigation.

Outside the CDPA. Under Alternative A, management actions addressing coal development outside the CDPA do not exist. Therefore, it is assumed that all BLM-administered lands outside the CDPA with coal development potential are considered acceptable for further consideration for coal leasing, resulting in a beneficial impact to coal leasing. However, under Alternative A, major and moderate restrictions from other resources have the potential to adversely impact coal development outside the CDPA by constraining development. The intensity of impacts to coal development outside the CDPA from major and moderate restrictions is the same as those identified in the oil and gas discussion under Alternative A.

Alternative B

Coal Exploration Impacts

Other Resource Restrictions on Coal Exploration. Under Alternative B, management actions from soils and special status species – wildlife would place restrictions on coal exploration in northern Converse County. Major restrictions would apply within the 4-mile protective buffer for greater sage-grouse leks (leks occur outside the CDPA, but protective buffers cross the boundary), and on soils with high wind-erosion potential within the CDPA. Major restrictions have the potential to result in adverse impacts to coal exploration because NSO is allowed or overlapping TLS restrictions apply. The remainder of the area would be managed with standard or moderate restrictions. Moderate restrictions may limit the time of operation or require specific mitigation, but they do not preclude coal exploration. Impacts to coal exploration from moderate restrictions are adverse, but minor in nature.

Adverse impacts to coal exploration from other resource restrictions are greater under Alternative B than under any other alternative. Moderate and major restrictions for Alternative B are illustrated on Map 9

for Oil and Gas. Restrictions from other resources apply to the life of the RMP, but can be changed by amending the RMP.

Coal Leasing Impacts

Under Alternative B, no coal development would be considered inside or outside the CDPA. While existing leases would be honored, the CDPA would be closed to further leasing under Alternative B. This management action results in a direct, adverse impact to coal leasing.

Alternative C

Coal Exploration Impacts

Other Resource Restrictions on Coal Exploration. Under Alternative C, major restrictions would apply within the 2-mile protective buffer for greater sage-grouse leks (leks occur outside the CDPA, but protective buffers cross the boundary) on the western boundary of the CDPA. Major restrictions have the potential to result in an adverse impact to coal exploration because surface disturbance is restricted. The remainder of the area would be managed with standard or moderate restrictions. Moderate restrictions may limit the time of operation or require specific mitigation, but they do not preclude coal exploration. Impacts to coal exploration from moderate restrictions are adverse, but minor in nature.

Impacts to coal exploration from other resource restrictions under Alternative C are greater than, but similar to, Alternative A. Moderate and major restrictions for Alternative C are illustrated on Map 10 for Oil and Gas. Restrictions from other resources apply to the life of the RMP, but can be changed by amending the RMP.

Coal Leasing Impacts

Impacts to coal leasing under Alternative C are the same as those identified under Alternative B.

Alternative D

Coal Exploration Impacts

Other Resource Restrictions on Coal Exploration. Under Alternative D, no major restrictions occur within the CDPA. Moderate restrictions exist within the CDPA and may limit the time of operation or require specific mitigation, but they do not preclude coal exploration. Impacts to coal exploration from moderate restrictions are adverse, but minor in nature.

Impacts to coal exploration from other resource restrictions under Alternative D are less than, but similar to, Alternative A. Moderate restrictions for Alternative D are illustrated on Map 11 for Oil and Gas. Restrictions from other resources apply to the life of the RMP, but can be changed by amending the RMP.

Coal Leasing Impacts

Within the CDPA. Under Alternative D, BLM-administered lands identified in the 2001 Buffalo RMP maintenance action are acceptable for further consideration for coal leasing. The only exceptions are those lands determined unacceptable within the planning area. The coal unsuitability criteria are reevaluated whenever new coal lease applications are received. Under Alternative D, restrictions from other resources have the potential to impact coal leasing during the reapplication of coal screens; however, restrictions under this alternative are moderate, and adverse impacts are anticipated to be minor in nature.

Outside the CDPA. Under Alternative D, all BLM-administered lands outside the CDPA with coal development potential will be considered for coal leasing unless specifically identified as unacceptable

for consideration for further coal leasing. This proactive coal development management action results in a beneficial impact to coal development. However, under Alternative D, major and moderate restrictions from other resources have the potential to adversely impact coal development outside the CDPA by constraining development. The intensity of impacts to coal development outside the CDPA from major and moderate restrictions is the same as that identified in the oil and gas discussion under Alternative D.

Alternative E (Preferred Alternative)

Coal Exploration Impacts

Other Resource Restrictions on Coal Exploration. The impacts to coal exploration within the CDPA are the same as those described under Alternative D.

Coal Leasing Impacts

Impacts to coal leasing under Alternative E are the same as those identified under Alternative D except the intensity of impacts from other resources would be the same as that identified in the oil and gas discussion under Alternative E.

4.2.2.3 Conclusion

Allowable uses and management actions described in this section for the various alternatives were used to determine the potential impacts to coal exploration and development. Meaningful differences in resource restrictions on coal form the basis for the following conclusion. Impacts to coal from the alternatives are anticipated to be similar in type, primarily adverse, but different in intensity, based on the type of restriction in place (i.e., major, moderate, standard). For the purposes of this analysis, it is assumed that future exploration and development of coal reserves will occur within the CDPA. Under this assumption, alternatives D, E, and A, respectively, have the least potential adverse impact on coal exploration and development because they place the fewest restrictions on surface-disturbing activities and reclamation. Alternatives B and C close the planning area to further leasing, resulting in an adverse impact on coal leasing and development in the planning area.

4.2.3 Leasable – Geothermal

Exploration for geothermal resources on BLM-administered public surface is permitted at the BLM's discretion. Little geothermal exploration or development has occurred within the planning area. Potential exists for development as a byproduct of oil and gas operations or water resource development. The most likely use of the resource would be localized with small areas of surface disturbance (BLM 2005e). Any adverse impacts to geothermal resources are expected to be minor for all alternatives.

4.2.4 Leasable – Oil and Gas

Management actions implemented for the protection of other resources impact the oil and gas industry both directly and indirectly. A direct impact is one that either specifically prohibits or permits oil and gas exploration and development. An example of a direct impact would be the closure of an area to oil and gas leasing to protect another resource. Indirect impacts are the result of actions that may place or remove restrictions or additional requirements on oil and gas exploration and development. These actions do not explicitly permit or prohibit oil and gas exploration and development activity, but may influence a company's decision on whether to proceed with a given project. An example of an indirect impact might be a seasonal restriction that would prevent entry into a greater sage-grouse nesting area for part of the year. Short-term impacts are those impacts that occur in less than 5 years. A TLS or other moderate resource restrictions result in short-term impacts. Long-term impacts occur beyond the first 5 years and perhaps for the duration of the management plan. Closures and major restrictions result in long-term impacts.

4.2.4.1 Methods and Assumptions

The impact analysis used the following methods and assumptions:

- Analysis began with the baseline total unconstrained oil and gas development potential taken from the Reasonable Foreseeable Development (RFD) scenario for oil and gas (BLM 2005f) as summarized in Chapter 3 and applied the constraints from the other resource programs in Chapter 2. Each of the alternative's constraints impacted oil and gas development.
- Most of the planning area has a high occurrence potential for oil and gas (BLM 2005f).
- The RFD scenario for oil and gas (BLM 2005f) based development potential on the anticipated drilling activity over the next 20 years, with most of the development occurring as infill wells in existing fields.
- Analysis assumed that the BLM can permit geophysical exploration activities in more restrictive visual resource management (VRM) areas because the operations are short-term activities.
- The BLM considers OHV use for geophysical operations a "necessary task" under the OHV designations for each alternative.
- Unless the BLM amends the RMP, restrictions on resource uses apply to the life of the RMP.
- The acreage numbers in Table 4-5 for moderate and major constraints to oil and gas development could increase substantially because they do not reflect the number of unknown acres associated with greater sage-grouse nesting habitats outside the buffer areas around leks that would be subject to a TLS.
- Other federal agencies have closed the Naval Petroleum Reserve, (the U.S. Department of Energy [DOE]), Camp Guernsey (Military), and Fort Laramie National Historic Site (National Park Service [NPS]) areas to oil and gas leasing.

4.2.4.2 Analysis of Alternatives

Impacts Common to All Alternatives

Under the regulations of 43 CFR 3150, the BLM is responsible for authorizing and administering geophysical exploration operations on all public surface lands within the planning area while the WOGCC is responsible for authorizing all operations on state and private surface. Under the 43 CFR 3160 regulations, the BLM authorizes geophysical exploration under an oil and gas lease via Sundry Notice approval. The information gained from geophysical exploration reduces the number of dry holes drilled during the field development stage resulting in less unnecessary surface impacts and fewer impacts to other resources.

- Major restrictions like NSO stipulations or overlapping TLS restrictions have the potential of resulting in adverse impacts to oil and gas exploration and development. Companies typically drill oil and gas wells vertically because the costs are lower and drilling problems are less likely, but they could employ directional drilling in an area with NSO to protect other resources. For example, an operator could place a drilling location, access road, or production facility in a less-sensitive area and drill the well directionally to recover reserves underlying the area with the surface-disturbance restriction. But directional drilling is 1.5 to 4 times more costly than vertical drilling, and the increased costs could make some drilling ventures uneconomical. Companies can utilize directional drilling to tap oil and gas reserves on portions or margins of oil and gas leases in large contiguous areas subject to NSO and employ this technology to develop isolated NSO lease parcels. Since directional drilling has its horizontal limitations, operators could not develop all the oil and gas resources from all the acreage associated with large NSO areas such as

those associated with 4-mile buffer zones around greater sage-grouse leks. Companies typically cannot use directionally drilling to develop CBNG as the reservoirs are too shallow. In areas with overlapping TLS restrictions, companies would be limited to narrow timeframes to complete work. In some cases, an operator may have to start development and then postpone operations during critical time periods. If the window during which work can be done is too short, a development project may have to be done in phases, requiring more time to complete, adding to the project's cost, and prolonging the time before the investment is recovered. A company may decide not to develop the reserves if it considers the project marginal without the additional requirements and added time and cost.

- Impacts from moderate restrictions, while adverse, are indirect and are not as severe as those resulting from major restrictions. Moderate restrictions may limit the time of operation or require specific mitigation, but they do not necessarily remove the acreage from development or require directional drilling. Under TLS restrictions, development may become more intensive over a shorter timeframe in order to complete operations before timing restrictions start.
- Management directives for air quality will allow emissions from drilling and production activities up to applicable standards and guidelines, which would represent a limiting factor for oil and gas development within the planning area.
- Most of the oil and gas development will occur in Class III or Class IV VRM areas under all alternatives. To meet the visual requirements of a Class III VRM area, operators will incur additional costs to develop the oil and gas resources.
- In portions of the planning area, conflicts will occur under all alternatives between oil and gas development and other mineral development, such as coal and uranium mining. The BLM has established CAZs near the Antelope Coal Mine. A CAZ identifies an area around an active coal mine where coal mining operations will occur in the next 10 years and conflicts between coal mining and CBNG development will occur. When areas of conflict are identified, the BLM notifies the oil and gas lessees in the CAZ areas and requires the operators to develop their leases to avoid losing the CBNG resource unless the operator demonstrates that it is uneconomical to do so. Conflicts also will occur between in-situ uranium mining operations and developing CBNG from the same geologic horizon. CBNG development would not be compatible in active in-situ uranium mining areas because the de-watering process would harm in-situ operations and the associated oil and gas produced water may be radioactive.

In January 2003, BLM administered oil and gas leases covered 1,738,185 acres in the planning area, which is about 37 percent of the federal mineral estate within the planning area. The acreage leased for oil and gas is almost entirely in Natrona and Converse counties (BLM 2005f).

Alternative A

Geophysical Exploration. Alternative A allows for operators to conduct geophysical exploration on the BLM-administered lands open to oil and gas leasing. The alternative also allows for geophysical operations on BLM-administered lands open to leasing that are subject to NSO if the activity is determined to have no substantial impact on other resources through an environmental analysis. These proactive oil and gas management actions result in a beneficial impact to oil and gas exploration.

Areas Closed to Oil and Gas Leasing. Alternative A closes approximately 37,922 acres (< 1%) of BLM-administered mineral estate to oil and gas leasing (Table 4-5 and Map 8). Compared to all other alternatives, Alternative A closes the second lowest acreage to oil and gas leasing. Closures under Alternative A are the result of protective management actions listed in Table 4-6. These management actions result in direct adverse impacts to oil and gas leasing and development.

Table 4-5. Total Acres of BLM Federal Mineral Estate Closed/Open to Oil and Gas Leasing by Alternative in the Casper Planning Area

Restriction	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Open with Standard Conditions Percent (%) of Federal Mineral Estate	1,136,855 24%	446,019 10%	1,012,656 22%	1,524,375 33%	1,080,935 23%
Open with Moderate Restrictions Percent (%) of Federal Mineral Estate	2,711,404 58%	1,196,922 26%	2,058,162 44%	2,445,107 53%	2,506,530 54%
Open with Major Restrictions Percent (%) of Federal Mineral Estate	770,991 17%	2,296,267 49%	1,113,078 24%	662,664 14%	843,139 18%
Closed to Leasing Percent (%) of Federal Mineral Estate	37,922 <1%	717,964 15%	473,276 10%	25,026 <1%	226,568 5%

Source: BLM 2005a

< less than

BLM Bureau of Land Management

Table 4-6. Acres of BLM Federal Mineral Estate Closed to Oil and Gas Leasing by Resource in the Casper Planning Area

Restriction	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Fragmentation Alternative	0	580,007	238,724	0	168,386
Sand Hills	0	17,633	17,633	0	17,633
South Bighorns	0	216,460	309,854	0	75,913
North Platte River	0	15,286	7,840	6,054	0
Other Federal No-lease Areas	22,232	0	0	0	0
Muddy Mountain EEA		1,419	1,419	1,419	1,419
Naval Petroleum Reserve No. 3	9,324	9,324	9,324	9,324	9,324
Fort Laramie	792	940	940	940	940
Camp Guernsey	5,620	11,850	11,850	5,620	11,850
Total	37,922	852,774	597,439	23,213	285,320

Note: Due to overlaps in the Fragmentation Alternatives and the alternatives for the South Bighorns, acres in this table do not add to the total mineral estate closed to oil and gas leasing in Table 4-5.

BLM Bureau of Land Management

EEA Environmental Education Area

No. Number

Other Resource Restrictions. Under Alternative A, management actions from other resources, including soil, water, wildlife, special status species, cultural, paleontology, recreation, and special designations, would place restrictions of varying types and intensity on oil and gas exploration and development (refer to Table 2-3, Details of Alternatives). Under Alternative A, 1,136,855 acres of BLM administered mineral estate is open to oil and gas development with standard stipulations, 2,711,404 acres are open with moderate restrictions, and 770,991 acres are open with major restrictions (refer to Table 4-5).

Compared to all other alternatives, Alternative A proposes the second lowest acreage with major restrictions on exploration and oil and gas development. Alternative A proposes the highest number of acres with moderate restrictions. NSO associated with the Jackson Canyon ACEC, Muddy Mountain EEA, North Platte River, Muddy Mountain elk crucial winter range area, Pterodactyl tracts, Red Wall/Gray Wall, and bald eagle roosts, nests, and feeding areas will have a minor impact on conventional oil and gas and CBNG development, as the areas have low to very low or no oil and gas development potential for both resources.

The management prescription for NSO within ¼ mile of a historic trail will have an adverse impact on conventional oil and gas and CBNG development. VRM prescriptions also will impact conventional oil and gas development. Of the 80,285 acres of BLM-administered mineral estate within the ¼ mile NSO for historic trails, 2,517 acres have a high potential for conventional oil and gas development; 4,213 acres have a moderate development potential for conventional oil and gas and 1,773 acres have a moderate development potential for CBNG; 36,265 acres have a low development potential for conventional oil and gas and 10,194 acres have a low development potential for CBNG; and the remaining acres have very low to no development potential for both resources. This alternative has 365,967 acres of BLM-administered mineral estate with a Class II VRM status of which 8,400 acres have a moderate development potential for conventional oil and gas and the remaining acres have a low to very low to no development potential for conventional oil and gas and CBNG. While the management prescriptions for VRM and historic trails do not prohibit drilling, companies would have to drill directionally to develop the oil and gas reserves making some of the ventures unfeasible or uneconomical. Potential adverse impacts to exploration and oil and gas development from other resource restrictions under Alternative A are less than all other alternatives with the exception of Alternative D (see Table 4-5).

Alternative A projects that 467 federal CBNG wells and 1,356 federal conventional oil and gas wells will be drilled in the planning area between 2001 and 2020 (Table 4-7). Of these wells, the RFD estimates that there will be 458 productive CBNG wells and 1,081 productive oil and gas wells (a 6-percent decrease in producing CBNG wells and a 9-percent decrease in producing conventional wells from the unconstrained baseline projection).

Alternative B

Geophysical Exploration. Under Alternative B, companies could conduct geophysical exploration operations on BLM-administered lands open to oil and gas leasing, but not on BLM-administered surface open to leasing with an NSO stipulation. Compared to Alternative A, fewer lands would be open to geophysical operations under Alternative B, resulting in an adverse impact to oil and gas exploration activities.

Areas Closed to Oil and Gas Leasing. Alternative B closes 717,964 acres (15%) of BLM-administered mineral estate to oil and gas leasing (refer to Table 4-5 and Map 9). Closures under Alternative B result from a range of resources, including vegetation (habitat fragmentation) and special designations (refer to Table 4-6). These management actions result in direct adverse impacts to oil and gas development. The proposed South Bighorns/Red Wall ACEC and the habitat fragmentation blocks contain the bulk of the acreage closed to oil and gas leasing, but the RFD (BLM 2005f) has identified most of this area as having low to very low or no development potential for conventional oil and gas and CBNG. The South Bighorns/Red Wall ACEC contains 216,460 acres of BLM-administered mineral estate, of which 7,946 acres have a moderate oil and gas development potential for conventional oil and gas. The remaining area has a low to very low to no development potential for both conventional oil and gas and CBNG. The proposed habitat fragmentation blocks contain 580,007 acres of BLM-administered mineral estate with low to very low to no development potential for both conventional oil and gas or CBNG. Consequently, these special designations would have only a minor impact on the total development projected under this alternative. The proposed Sand Hills SMA contains 17,633 acres of BLM-administered mineral estate, of which 3,172 acres are presently held by production and 10,265 acres are presently leased; as a result, this designation would have only a minor impact on the total development projected under this alternative for conventional oil and gas and CBNG. The no-leasing area associated with the Muddy Mountain Environmental Education Area (EEA) containing 1,419 acres of BLM-administered mineral estate and the North Platte River containing 15,286 acres of BLM-administered mineral estate will not have a substantial impact on development, since these areas have very low to no development potential for both

conventional oil and gas and CBNG. Compared to Alternative A and all other alternatives, closures under Alternative B would have the greatest adverse impact on oil and gas exploration and development.

Table 4-7. Projected BLM Federal Wells Drilled by Alternative through 2020 in the Casper Planning Area

	Coalbed Natural Gas Wells	Oil and Gas Wells	Total Wells
Projected Wells Drilled (2001 – 2020)[1]			
Baseline – Wells Drilled (Unconstrained)	**497**	**1,491**	**1,988**
Alternative A – Wells Drilled Percent Reduction from Baseline	467 6%	1,356 9%	1,823 8%
Alternative B – Wells Drilled Percent Reduction from Baseline	65 87%	125 92%	190 90%
Alternative C – Wells Drilled Percent Reduction from Baseline	430 13%	1,234 17%	1,664 16%
Alternative D – Wells Drilled Percent Reduction from Baseline	468 6%	1,332 11%	1,800 9%
Alternative E – Wells Drilled Percent Reduction from Baseline	469 6%	1,345 10%	1,813 9%
Projected Producing Wells (2001 – 2020)[1]			
Base Line – Producing Wells (Unconstrained)	**487**	**1,189**	**1,676**
Alternative A – Producing Wells Percent Reduction from Baseline	458 6%	1,081 9%	1,539 8%
Alternative B – Producing Wells Percent Reduction from Baseline	64 87%	100 92%	164 91%
Alternative C – Producing Wells Percent Reduction from Baseline	421 14%	984 17%	1,405 16%
Alternative D – Producing Wells Percent Reduction from Baseline	459 6%	1,062 11%	1,521 9%
Alternative E – Producing Wells Percent Reduction from Baseline	460 6%	1,072 10%	1,532 9%

Source: BLM 2005f

[1]Well counts do not include existing wells.

BLM Bureau of Land Management

Other Resource Restrictions. Under Alternative B, management actions from other resources, including soil, water, vegetation, wildlife, special status species, cultural, paleontology, recreation, and special designations would place restrictions of varying types and intensity on oil and gas exploration and development (refer to Table 2-3, Details of Alternatives). Under Alternative B, 446,019 acres of BLM-administered mineral estate are open to oil and gas development with standard stipulations; 1,196,922 acres are open with moderate restrictions; and 2,296,267 acres are open with major restrictions (refer to Table 4-5).

Compared to all other alternatives, Alternative B proposes the highest acreage with major restrictions on exploration and oil and gas development. Management prescriptions under the proposed Bates Hole SMA would have a limited impact on development since the RFD projects in this area have very low to no development potential for both conventional oil and gas and CBNG. Prescriptions under the proposed Cedar Ridge ACEC would impact conventional oil and gas development, since the RFD projects that most of the BLM-administered mineral estate (18,591 acres) has a moderate development potential. The ACEC has a very low to no development potential for oil and gas. Although the ACEC does not prohibit drilling, prescriptions like CSU stipulations, NSO on the Traditional Cultural Property (TCP) area, and directional drilling requirements may make some drilling ventures unfeasible or uneconomical.

NSO stipulations under this alternative for highly erosive soils and greater sage-grouse nesting habitats will have the biggest adverse impact on oil and gas development. Of the 575,778 acres of BLM-administered mineral estate with highly erosive soils that would be subject to NSO, 6,661 acres have a high development potential for conventional oil and gas and 1,177 acres have a high development potential for CBNG; 13,222 acres have a moderate development potential for conventional oil and gas and 4,231 acres have a moderate development potential of CBNG; 180,740 acres have a low development potential for conventional oil and gas and 58,264 acres have a low development potential for CBNG; and the remaining acres have either very low or no development potential for both resources. Of the 1,782,953 acres of BLM administered mineral estate in greater sage-grouse nesting habitats within 4 miles of leks that would be subject to NSO, 12,015 acres have a high development potential for conventional oil and gas; 112,275 acres have a moderate development potential for conventional oil and gas and 16,427 acres have moderate development potential for CBNG; 877,073 acres have a low development potential for conventional oil and gas and 223,867 acres have a low development potential of CBNG; the remaining acres have either very low to no development potential for both resources. Although these prescriptions do not prohibit drilling, companies would have to drill directionally to develop the oil and gas reserves, making some of the ventures unfeasible or uneconomical.

The NSO and CSU stipulations attributed to the historic trails and the management prescriptions for VRM also would have an adverse impact on oil and gas development. Of the 80,285 acres of BLM-administered mineral estate within the ¼-mile NSO for historic trails, 2,517 acres have a high development potential for conventional oil and gas; 4,213 acres have a moderate development potential for conventional oil and gas and 1,773 acres have a moderate development potential for CBNG; 36,265 acres have a low development potential for conventional oil and gas and 10,194 acres have a low development potential for CBNG; and the remaining acres have very low to no development potential for both resources. This alternative has 1,062,550 acres of BLM-administered mineral estate with a Class II VRM status, of which 19,687 acres have a moderate development potential for conventional oil and gas and the remaining acres have a low to very low to no development potential for conventional oil and gas and CBNG. Although these prescriptions do not prohibit drilling, companies would have to drill directionally to develop the oil and gas reserves, making some of the ventures unfeasible or uneconomical.

NSO associated with the Jackson Canyon ACEC, Muddy Mountain elk crucial winter range area, and bald eagle roosts, nests, and feeding areas will have a limited impact on conventional oil and gas and CBNG development as the areas have low to very low or no oil and gas development potential for both resources. Adverse impacts to exploration and oil and gas development from other resource restrictions under Alternative B are greater than under all other alternatives.

Under Alternative B, it is projected that 65 federal CBNG wells and 125 federal conventional oil and gas wells would be drilled on federal mineral estate between 2001 and 2020 (refer to Table 4-7). Of these wells, the RFD estimates that there would be 64 productive CBNG wells and 100 productive oil and gas wells. Alternative B results in a 92-percent decrease in producing oil and gas wells and an 87-percent decrease in producing CBNG wells from the unconstrained baseline projection. Companies would have to drill many conventional federal wells directionally from existing well pads due to large NSO areas associated with erosive soils and 4-mile buffer zones around greater sage-grouse leks. Companies would develop only a few CBNG reserves because these wells are too shallow to use directional drilling technology. Federal oil and gas resources would be subject to drainage from offsetting state and private wells, which are not subject to the constraints. Compared to Alternative A and all other alternatives, adverse impacts to oil and gas development are greatest under Alternative B.

Alternative C

Geophysical Exploration. Impacts under Alternative C are the same as Alternative B for geophysical exploration operations.

Areas Closed to Oil and Gas Leasing. Alternative C closes 473,276 acres (10%) of BLM-administered mineral estate to oil and gas leasing; (see Table 4-5 and Map 10). Closures under Alternative C result from a range of resources including vegetation (habitat fragmentation) and special designations (refer to Table 4-6). These management actions result in direct adverse impacts to oil and gas leasing and development. The proposed South Bighorns/Red Wall SMA and the habitat fragmentation blocks contain the bulk of the acreage closed to oil and gas leasing, but the RFD (BLM 2005f) has identified most of this area as having low to very low or no oil and gas development potential for both conventional oil and gas and CGNG. The South Bighorns/Red Wall SMA contains 309,854 acres of BLM-administered mineral estate, of which 39,653 acres have a low development potential for conventional oil and gas and the remaining acres have a very low to no development potential for conventional oil and gas. The entire area has no development potential for CBNG. The proposed habitat fragmentation blocks contain 238,724 acres of BLM-administered mineral estate, of which 116 acres have a low development potential for conventional oil and gas and 1,194 acres have a low development potential for CBNG. The remaining acres have a very low to no development potential for both resources. Consequently, these special designations would only have a minor impact on the total development projected under this alternative. The proposed Sand Hills SMA would have the same impact on oil and gas development as Alternative B. The no-leasing areas associated with the North Platte River ACEC/Special Recreation Management Area (SRMA) and Muddy Mountain EEA will have a minor impact on oil and gas development since most of the acreage is in low to very low to no development potential for both conventional oil and gas and CBNG.

Other Resource Restrictions. Under Alternative C, management actions from other resources, including soils, water, vegetation, wildlife, special status species, cultural, and special designations, would place restrictions of varying types and intensity on oil and gas exploration and development (refer to Table 2-3, Details of Alternatives). Under Alternative C, 1,012,656 acres of BLM-administered mineral estate are open to oil and gas development with standard stipulations; 2,058,162 acres are open with moderate restrictions; and 1,113,078 acres are open with major restrictions (refer to Table 4-5).

Compared to all other alternatives, Alternative C proposes the second highest acreage with major restrictions on exploration and oil and gas development. Under Alternative C, adverse impacts to exploration and oil and gas development from other resource restrictions are greater than under Alternative A, but less than Alternative B. The proposed Bates Hole SMA would have the same impact on oil and gas development as Alternative B. Prescriptions under the proposed Cedar Ridge SMA would impact conventional oil and gas development since the RFD projects that most of the BLM-administered mineral estate (16,994 acres) has a moderate development potential. The Cedar Ridge SMA has very low to no development potential for CBNG. While the ACEC does not prohibit drilling, prescriptions like CSU stipulations, NSO on the TCP area and directional drilling requirements may make some drilling ventures unfeasible or uneconomical.

Management prescriptions for greater sage-grouse nesting and VRM also will have an adverse impact on development under this alternative. Of the 688,761 acres of BLM-administered mineral estate in greater sage-grouse nesting habitats within 2 miles of leks that would be subject to NSO, 214 acres have a high development potential for conventional oil and gas; 50,309 acres have a moderate development potential for conventional oil and gas and 2,977 acres have a moderate development potential for CBNG; 336,442 acres have a low development potential for conventional oil and gas and 92,328 acres have a low development potential for CBNG; and the remaining acres have a very low to no development potential

for both resources. This alternative has 816,310 acres of BLM-administered mineral estate with a Class II VRM status of which 10,957 acres have a moderate development potential for conventional oil and gas and the remaining acres have a low to very low to no development potential for conventional oil and gas and CBNG. While the prescriptions for greater sage-grouse nesting habitats and VRM do not prohibit drilling, operators would have to directionally drill to develop the resources, making some ventures unfeasible or uneconomical.

NSO associated with the Jackson Canyon ACEC, Muddy Mountain elk crucial winter range area, and bald eagle roosts, nests, and feeding areas will have a minor impact on conventional oil and gas and CBNG development, as these areas have low to very low or no oil and gas development potential for both resources.

Under Alternative C, it is projected that 430 federal CBNG wells and 1,234 federal conventional oil and gas wells would be drilled on federal mineral estate between 2001 and 2020 (refer to Table 4-7). Of these wells, the RFD estimates that there would be 421 productive CBNG wells and 984 productive oil and gas wells. Alternative C results in a 13-percent decrease in producing CBNG wells and a 17-percent decrease in conventional producing oil and gas wells from the unconstrained baseline projection. The number of producing wells projected under Alternative C is slightly lower than those projected under Alternative A. The reduction in wells from the unconstrained baseline projection is mainly attributable to constraints associated with measures to protect vegetation, greater sage-grouse nesting habitats, the Cedar Ridge TCP, and VRM.

Alternative D

Geophysical Exploration. Alternative D allows operators to conduct geophysical exploration on all BLM-administered surface lands. Compared to Alternative A, more lands would be open to geophysical operations under Alternative D, resulting in a beneficial impact to oil and gas exploration activities.

Areas Closed to Oil and Gas Leasing. Under Alternative D, 25,026 acres (<1%) of BLM-administered mineral estate are closed to leasing (Table 4-5 and Map 11). Closures under Alternative D are the result of protective management actions listed in Table 4-6. Closure of mineral estate to oil and gas leasing results in an adverse impact to oil and gas development; however, compared to Alternative A and all other alternatives, Alternative D has the least adverse impact on oil and gas development. Closure of the Muddy Mountain EEA and areas along the North Platte River will have a minor impact, as both areas have very low to no development potential for conventional oil and gas and CBNG.

Other Resource Restrictions. Under Alternative D, management actions from other resources, including water, wildlife, special status species, cultural, and special designations would place restrictions of varying types and intensity on oil and gas exploration and development (refer to Table 2-3, Details of Alternatives). Under Alternative D, 1,524,375 acres of BLM-administered mineral estate is open to oil and gas development with standard stipulations, 2,445,107 acres are open with moderate restrictions, and 662,664 acres are open with major restrictions (refer to Table 4-5).

Compared to all other alternatives, Alternative D proposes the lowest acreage with major restrictions on exploration and oil and gas development. Alternative D proposes the third lowest number of acres with moderate restrictions. Adverse impacts to exploration and oil and gas development from other resource restrictions under Alternative D are less than under Alternative A. NSO associated with the Jackson Canyon ACEC, Muddy Mountain elk crucial winter range area, and bald eagle roosts, nests, and feeding areas will have a minor impact on conventional oil and gas and CBNG development as the areas have low to very low or no oil and gas development potential for both resources. This alternative has 465,688 acres of BLM-administered mineral estate with a Class II VRM status, of which 16,331 acres have a moderate

development potential for conventional oil and gas and the remaining acres have a low to very low to no development potential for conventional oil and gas and CBNG. While the management prescriptions for VRM do not prohibit drilling, operators would have to directionally drill to develop the resources, making some ventures unfeasible or uneconomical.

Under Alternative D, it is projected that 468 federal CBNG wells and 1,332 federal conventional oil and gas wells would be drilled on federal mineral estate between 2001 and 2020 (refer to Table 4-7). Of these wells, the RFD estimates that there would be 459 productive CBNG wells and 1,062 productive oil and gas wells (a 6-percent decrease in the number of producing CBNG wells and an 11-percent decrease in the number of producing conventional oil and gas wells from the unconstrained baseline projection). The wells projected under Alternative D are slightly lower than those projected under Alternative A.

Alternative E (Preferred Alternative)

Geophysical Exploration. Impacts on geophysical operations under Alternative E would be the same as those identified under Alternative A.

Areas Closed to Oil and Gas Leasing. Alternative E closes 226,568 acres (5%) of BLM-administered mineral estate to oil and gas leasing (see Table 4-5 and Map 12). Closures under Alternative E are the result of a variety of protective management actions, including vegetation (habitat fragmentation) and special designations (refer to Table 4-6). Closure of mineral estate to oil and gas leasing would result in an adverse impact to oil and gas development. The proposed South Bighorns/Red Wall SMA and the habitat fragmentation blocks contain the bulk of the acreage closed to oil and gas leasing, but the RFD (BLM 2005f) has identified most of this area as having low to very low development potential for conventional oil and gas. The South Bighorns/Red Wall SMA contains 75,913 acres of BLM administered mineral estate of which 1,535 acres have a low development potential for conventional oil and gas, and 74,378 acres of have a very low development potential for oil and gas. The entire SMA has no development potential for CBNG. The proposed habitat fragmentation blocks containing 168,386 acres of BLM-administered mineral estate have 116 acres with low development potential for conventional oil and gas, 146,554 acres with very low development potential for conventional oil and gas, and 21,716 acres with no potential. The entire area has no development potential for CBNG. Consequently, these special designations would have only a minor impact on the total development projected under this alternative. The proposed Sand Hills SMA and Muddy Mountain EEA would have the same impact on oil and gas development as Alternative B.

Other Resource Restrictions. Under Alternative E, management actions from other resources, including water, wildlife, vegetation, special status species, cultural, and special designations, would place restrictions of varying types and intensity on oil and gas exploration and development (refer to Table 2-3, Details of Alternatives). Under Alternative E, 1,080,935 acres of BLM-administered mineral estate is open to oil and gas development with standard stipulations, 2,506,530 acres are open with moderate restrictions, and 843,139 acres are open with major restrictions (see Table 4-5).

Compared to all other alternatives, Alternative E proposes the third lowest acreage with major restrictions on exploration and oil and gas development. Alternative E proposes the second highest acreage with moderate restrictions. Adverse impacts to exploration and oil and gas development from other resource restrictions under Alternative E are similar to those under Alternative A. The proposed Bates Hole SMA would have the same impact on oil and gas development as Alternative B. The NSO on the Cedar Ridge TCP would impact conventional oil and gas development because it contains 3,501 acres of BLM administered mineral estate with moderate development potential for conventional oil and gas. NSO associated with the Jackson Canyon ACEC, North Platte River ACEC/SRMA, Muddy Mountain elk crucial winter range area, and bald eagle roosts, nests, and feeding areas will have a limited impact on

conventional oil and gas and CBNG development as the areas have low to very low or no oil and gas development potential for both resources. VRM impacts would be the same as Alternative C.

Under Alternative E, it is projected that 469 federal CBNG wells and 1,345 federal conventional oil and gas wells would be drilled on federal mineral estate between 2001 and 2020 (refer to Table 4-7). Of these wells, the RFD estimates that there would be 460 productive CBNG wells and 1,072 productive oil and gas wells (a 6-percent decrease in producing CBNG wells and a 10-percent decrease in producing conventional oil and gas wells from the unconstrained baseline projection). Alternative E is similar to Alternative A with respect to the number of projected wells.

4.2.4.3 Conclusion

Differences in the size of areas closed to oil and gas development and other resource restrictions on oil and gas drilling and development form the basis for the following conclusion. Impacts to oil and gas from the alternatives are anticipated to be similar in type, primarily adverse, but different in intensity. Alternatives B and C place greater constraints on geophysical operations compared to alternatives A, D, and E. Alternative D results in the least potential restrictive impacts to geophysical operations because it allows the most acreage available for exploration. Closures for oil and gas leasing are lowest under Alternative D. Considering closures, major restrictions from other resources, and the number of producing wells expected, Alternative A results in the least potential adverse impacts to oil and gas exploration and development, followed by alternatives E and D. Conversely, Alternative B results in the greatest number of closures to oil and gas leasing and major restrictions from other resources resulting in the greatest adverse impact to oil and gas development.

4.2.5 Leasable – Other Solid Leasables

Actions that could occur through implementation of an alternative may have the potential to affect access to other solid leasable minerals for exploration and development activities. Other types of actions may place or remove restrictions or additional requirements on exploration and development activities. An example of an additional restriction would be a viewshed restriction on development activity that, while not preventing access, requires that development activity be conducted so that it is not readily apparent.

4.2.5.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- About 623 acres of the federal leasable mineral estate has a moderate to high potential for occurrence of sodium (trona). Potential for sodium exploration and development activity is low for the planning period.
- About 9,030 acres of the federal leasable mineral estate has a moderate to high potential for occurrence of phosphate. Potential for phosphate exploration and development activity is low for the planning period.
- Uranium, bentonite, gypsum, limestone, and other hardrock minerals may be present on small amounts of acquired land and available for lease. Potential for uranium or bentonite activity is moderate to high for the planning period, while the other mineral types have a low potential.
- Any alternative that limits other solid leasable mineral development (i.e., reduces the area available for development) will have some adverse impact.
- Exploration activities could include coring or trenching to evaluate a deposits potential.
- Restrictions on resource uses apply to the life of the RMP, but can be changed by amending the RMP.

4.2.5.2 Analysis of Alternatives

Allowable uses and management actions with the potential to adversely impact mineral development include management actions that result in areas closed to leasing and areas of NSO, TLS, and CSU restrictions.

Impacts Common to All Alternatives

Restrictions on other solid leasables have the potential to result in adverse impacts to exploration and development activities when closures and NSO restrictions apply, since those activities require surface occupancy. The intensity of impacts is anticipated to vary by alternative. The greater the acreage closed or NSO, the greater the adverse impact to this resource. Therefore, impacts from closures and NSO restrictions are described under the individual alternatives. Restrictions linked to TLS restrictions and CSU restrictions may put some limits on activities associated with exploration and development, but these types of restrictions are not expected to prevent activity.

Alternative A

No closures or NSO restrictions apply to any of the federal mineral estate with potential sodium resources. Closures for steep slopes/erosive soils and NSO restrictions for VRM Class II and the South Bighorns/Red Wall area would adversely impact about half the federal mineral estate with potential phosphate resources. The impact of closures or NSO restrictions on those potential other solid leasable minerals on acquired lands appear to be minor.

Alternative B

NSO restrictions within 4 miles of occupied greater sage-grouse leks and for highly erosive soils areas would adversely impact about half the federal mineral estate with potential sodium resources. Closures and NSO restrictions would adversely impact the entire federal mineral estate with potential phosphate resources. VRM Class II, South Bighorns/Red Wall ACEC closure, NSO within 2 miles of greater occupied sage-grouse leks, and fragmentation block closures, respectively, would be the biggest impacts to potential phosphate resources. With the exception of bentonite and limestone, the impact of closures or NSO restrictions on those potential other solid leasable minerals on acquired lands appear to be minor. Adverse impacts of closures and NSO restrictions for bentonite and limestone could be greater, but actual comparisons of acquired lands to these restrictions have not been made.

Alternative C

Only minor amounts of NSO apply to the federal mineral estate with potential sodium resources. Closures and NSO restrictions would adversely impact the entire federal mineral estate with potential phosphate resources. The South Bighorns/Red Wall SMA closure, VRM Class II, fragmentation block closures, and NSO within 2 miles of occupied greater sage-grouse leks, respectively, would be the biggest impacts to potential phosphate resources. With the exception of bentonite and limestone, the impact of closures or NSO restrictions on those potential other solid leasable minerals on acquired lands appear to be minor. Adverse impacts of closures and NSO restrictions for bentonite and limestone could be greater, but actual comparisons of acquired lands to these restrictions have not been made.

Alternative D

No closures or NSO restrictions apply to any of the federal mineral estate with potential sodium resources. Only VRM Class II would impact the mineral estate with potential phosphate resources, but only in a minor way. The impact of closures or NSO restrictions on those potential other solid leasable minerals on acquired lands appear to be minor.

Alternative E (Preferred Alternative)

Only a minor amount of NSO applies to the federal mineral estate with potential sodium resources. Closures and NSO restrictions would adversely impact the entire federal mineral estate with potential phosphate resources. VRM Class II, fragmentation block closures, and the South Bighorns/Red Wall SMA closure, respectively, would be the biggest impacts to potential phosphate resources. With the exception of bentonite and limestone, the impact of closures or NSO restrictions on those potential other solid leasable minerals on acquired lands appear to be minor. Adverse impacts of closures and NSO restrictions for bentonite and limestone could be greater, but actual comparisons of acquired lands to these restrictions have not been made.

4.2.5.3 Conclusion

Impacts to other solid leasable minerals from alternatives are anticipated to be similar in type, primarily adverse, but different in intensity. Management actions may impact the acreage open to exploration and development and how these activities can be conducted. The sodium federal mineral estate is not impacted by any closures or NSO restrictions under alternatives A and D, and only in a minor way by NSO restrictions for alternatives C and E. Alternative B has the largest adverse impact on the sodium federal mineral estate, since about half is impacted by NSO restrictions for 4-mile areas occupied by greater sage-grouse leks and for highly erosive soils.

The phosphate federal mineral estate has the highest potential adverse impact of all other solid leasable minerals. Under Alternative D, potential impacts are minor. Alternative A has an adverse impact on about half the area with VRM Class II and a smaller closure for steep slopes/erosive soils. All other alternatives have large adverse impacts. VRM Class II impacts all phosphate federal mineral estate for each of these alternatives and closures impact all these lands for alternatives B and C and almost half for Alternative D. Greater sage-grouse-related NSO restrictions adversely impact more that two thirds of lands under Alternative B, less than one third under Alternative C, and none of the lands for Alternative E.

With the exception of bentonite and limestone, the impact of closures or NSO restrictions on those potential other solid leasable minerals on acquired lands appear to be minor for all alternatives. Adverse impacts of closures and NSO restrictions for bentonite and limestone could be greater under alternatives B, C, and E, but appear to be minor for alternatives A and D.

4.2.6 Salable

Actions that could occur through implementation of an alternative may have the potential to affect access to salable minerals. Other types of actions may place or remove restrictions or additional requirements on exploration and development activities. An example of an additional restriction would be a viewshed restriction on development activity that, while not preventing access, requires that development activity be conducted so that it is not readily apparent. Potential impacts to the sand and gravel resource are discussed in the Special Designations section (North Platte River ACEC/SRMA).

4.2.6.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The potential for occurrence of mineral materials exists across the planning area.
- About 197,836 acres of the federal mineral estate has a moderate to high potential for the occurrence of bentonite. Potential for salable bentonite development activity is moderate to low for the planning period.

- About 123,389 acres of federal mineral estate has a moderate to high potential for the occurrence of gypsum. Potential for salable gypsum development activity is low for the planning period.
- About 117,680 acres of federal mineral estate has a moderate to high potential for the occurrence of limestone. Potential for salable limestone development activity is moderate to low for the planning period.
- Additional common variety materials, such as decorative stone, clay (e.g., shale), borrow material, clinker (scoria), and leonardite (weathered coal), occur within the planning area, but their areal extents are not mapped. Commercial sand and gravel deposits are not sufficiently mapped for quantitative analysis. Some varieties (e.g., sand, gravel, and borrow material) have moderate to high potential for development, while the rest have moderate to low potential.
- Any alternative that limits mineral material development (i.e., reduces the area available for development) will have some adverse impact.
- Exploration activities could include coring or trenching to evaluate a deposit.
- Restrictions on resource uses apply to the life of the RMP, but can be changed by amending the RMP.

4.2.6.2 Analysis of Alternatives

Allowable uses and management action with the potential to adversely impact salable mineral development include management actions that result in areas closed to mineral material disposal, NSO areas (effectively closes areas to mineral material disposal), TLS restrictions, and CSU restrictions.

Impacts Common to All Alternatives

Restrictions on salable mineral development have the potential to result in substantial adverse impacts to exploration and development activities when closures and NSO restrictions apply, since these activities require surface occupancy. The intensity of impacts is anticipated to vary by alternative. The greater the acreage closed or NSO, the greater the adverse impact to this resource. Therefore, impacts from closures and NSO restrictions are described under the individual alternatives. Restrictions linked to TLS restrictions and CSU restrictions may add additional limits (mainly by increasing costs) on the ability of industry to develop these types of high-volume, cost-sensitive types of resources.

Adverse impacts to bentonite, gypsum, and limestone remain the same across all alternatives for certain management actions. The Jackson Canyon ACEC, Muddy Mountain elk crucial winter range, bald eagle roosts, bald eagle nests, and bald eagle feeding areas each remove the same amount of salable minerals from development for all alternatives. None of these management actions impacts more than about 3 percent of any of these mineral resource types, so associated impacts are considered to be minor.

Alternative A

Only minor amounts of closure to mineral material disposal or NSO restrictions apply to the federal mineral estate with potential salable bentonite resources. VRM Class II would adversely impact about half the potential gypsum resource, while the South Bighorns/Red Wall NSO would impact about one third and other restrictions would be minor. VRM Class II would adversely impact about 13 percent of the potential limestone resource, while other restrictions would be minor.

Approximately 52,276 acres (less than 1%) of the total federal mineral estate are closed to mineral material disposal in the planning area. These closures result from management actions for all bald eagle roosts, the Jackson Canyon ACEC, and federal mineral estate within ¼ mile of the North Platte River for its entire length in the planning area. Approximately 770,991 acres or 17% of federal mineral estate are

NSO or have overlapping TLS restrictions, which have the potential to effectively close these areas to mineral material disposal. Closures, NSO restrictions, and overlapping TLS restrictions have the potential to result in adverse impacts (by reducing access) to the additional common variety materials listed above in the Methods and Assumptions section.

Alternative B

VRM Class II and greater sage-grouse NSO restrictions each would adversely impact 130,173 acres and 133,489 acres respectively, or more than 60 percent of the federal mineral estate for the potential bentonite resource. NSO restrictions for habitat fragmentation would adversely impact 37 percent of the federal mineral estate for the potential bentonite resource, while NSO restrictions for highly erosive soils and the South Bighorns/Red Wall ACEC would adversely impact 12 percent to 21 percent. Other restrictions are minor in impact. VRM Class II (105,662 acres or 86%), South Bighorns/Red Wall ACEC (67,421 acres or 55%), fragmentation blocks (55,947 acres or 45%), greater sage-grouse NSO restrictions (65,204 acres or 45%), and highly erosive soils (41,080 acres or 21%) adversely impact the potential gypsum resource, with other restrictions being only minor in affect. For the potential limestone resource, VRM Class II would adversely impact about 44,609 acres or 38% and other restrictions would be less than 10 percent and minor in affect.

Approximately 673,797 acres (about 14%) of the total federal mineral estate are closed to mineral material disposal in the planning area. These closures result from management actions for all bald eagle roosts, the Jackson Canyon ACEC, the South Bighorns/Red Wall ACEC, Cedar Ridge TCP ACEC, Sand Hills SMA, habitat fragmentation blocks 1 through 16, and federal mineral estate within ¼ mile of the North Platte River for its entire length in the planning area. Approximately 2,296,267 acres or 49 percent of federal mineral estate are NSO or have overlapping TLS restrictions, which have the potential to effectively close these areas to mineral material disposal. Closures, NSO restrictions, and overlapping TLS restrictions have the potential to result in adverse impacts (by reducing access) to the additional common variety materials listed above in the Methods and Assumptions section.

Alternative C

VRM Class II adversely impacts about 106,196 or 54% of the federal mineral estate for the potential bentonite resource, while greater sage-grouse NSO restrictions (46,521 acres or 24%) and fragmentation blocks (30,703 acres or 16%) have a smaller adverse impact; other restrictions are minor. VRM Class II (95,311 acres or 77%), fragmentation blocks (48,811 acres or 40%), South Bighorns/Red Wall SMA (78,914 acres or 64%), and greater sage-grouse NSO restrictions (14,638 acres or 12%) adversely impact the potential gypsum resource, with other restrictions are minor in affect. For the potential limestone resource, VRM Class II would adversely impact about 26,712 acres or 23 percent and other restrictions would be minor in affect.

Approximately 301,933 acres (about 6%) of the total federal mineral estate are closed to mineral material disposal in the planning area. These closures result from management actions for all bald eagle roosts; the Jackson Canyon ACEC; Cedar Ridge TCP SMA; Sand Hills SMA; habitat fragmentation blocks 3, 5, 8, 11, 13, 15, and 16; and federal mineral estate within ¼ mile of the North Platte River for its entire length in the planning area. Approximately 1,113,078 acres or 24 percent of federal mineral estate are NSO or have overlapping TLS restrictions, which have the potential to effectively close these areas to mineral material disposal. Closures, NSO restrictions, and overlapping TLS restrictions have the potential to result in adverse impacts (by reducing access) to the additional common variety materials listed above in the Methods and Assumptions section.

Alternative D

Only minor amounts of closure to mineral material disposal or NSO restrictions apply to the federal mineral estate with potential salable bentonite and limestone resources. VRM Class II would adversely impact about 37 percent of the potential gypsum resource, while other restrictions would be minor.

Approximately 43,344 acres (less than 1%) of the total federal mineral estate are closed to mineral material disposal in the planning area. These closures result from management actions for all bald eagle roosts, the Jackson Canyon ACEC, and federal mineral estate within ¼ mile of the North Platte River for its entire length in the planning area. Approximately 662,664 acres (about 24%) of federal mineral estate are NSO or have overlapping TLS restrictions, which have the potential to effectively close these areas to mineral material disposal. Closures, NSO restrictions, and overlapping TLS restrictions have the potential to result in adverse impacts (by reducing access) to the additional common variety materials listed above in the Methods and Assumptions section.

Alternative E (Preferred Alternative)

VRM Class II adversely impacts about 106,196 acres or 54 percent of the federal mineral estate for the potential bentonite resource, while other restrictions are minor. VRM Class II (95,311 acres or 77%), South Bighorns/Red Wall SMA (53,624 acres or 43%), and fragmentation blocks (44,689 acres or 36%) adversely impact the potential gypsum resource, with other restrictions minor in affect. VRM Class II would adversely impact about 26,712 acres or 23 percent of the potential limestone resource, while other restrictions would be minor.

Approximately 665,570 acres (about 14%) of the total federal mineral estate are closed to mineral material disposal in the planning area. These closures result from management actions for all bald eagle roosts; the Jackson Canyon ACEC; Cedar Ridge TCP; Sand Hills SMA; habitat fragmentation blocks 3, 5, 8, 11, 13, 15, and 16 (with boundary adjustments from Alternative C); and federal mineral estate within ¼ mile of the North Platte River for its entire length in the planning area. Approximately 843,139 acres or 18 percent of federal mineral estate are NSO or have overlapping TLS restrictions, which have the potential to effectively close these areas to mineral material disposal. Closures, NSO restrictions, and overlapping TLS restrictions have the potential to result in adverse impacts (by reducing access) to the additional common variety materials listed above in the Methods and Assumptions section.

4.2.6.3 Conclusion

Impacts to salable minerals from alternatives are anticipated to be similar in type, primarily adverse, but different in intensity. Management actions may adversely impact the acreage available for exploration and development and how these activities can be conducted.

The potential bentonite federal mineral estate is impacted only in a minor way by closures and NSO restrictions under alternatives A and D. Alternative E has the next largest impact to bentonite, with more than half in VRM Class II. Alternative C also has the same VRM Class II restriction, with additional restrictions tied to greater sage-grouse NSO restrictions and fragmentation blocks. Alternative B has the greatest impact to potential bentonite resources. VRM Class II and greater sage-grouse NSO restrictions exceed 60 percent and fragmentation blocks and highly erosive soils exceed more that 15 percent.

The potential gypsum federal mineral estate is adversely impacted by at least one major action for all alternatives. Alternative D has the fewest major adverse impacts (one restriction of 37% of the potential gypsum federal mineral estate). Alternative B has two major adverse impacts (49% and 32%). Alternative C has three major adverse impacts (77%, 40%, and 11%). Alternative E has four major adverse impacts (77%, 43%, 36%, and 32%). Alternative B has five major adverse impacts (86%, 55%, 45%, 45%, and 32%).

For all alternatives, management actions applied to the potential limestone federal mineral estate have only a minor adverse impact, except for VRM Class II. VRM Class II is a minor adverse impact for Alternative D, an impact of 13 percent of the area for Alternative A, an impact of 15 percent for alternatives C and E, and an impact of 25 percent for Alternative B.

With respect to the additional common variety materials listed in the Methods and Assumptions section, it should be noted that the location of these potential areas are not mapped for this analysis. Therefore, predicting potential adverse impacts due to restrictions identified under each alternative were presented in a general way only.

4.3 Fire Management and Ecology

The impacts of alternatives on fire management and ecology are anticipated to affect the planning, management, implementation, and cost of fire management. Restrictions on fire management and ecology are considered direct impacts. Indirect impacts from alternatives include actions resulting in a change in risk or incidence of wildland fires; size, intensity, or destructive nature of wildland fires; fire suppression costs; and fuel loading. For example, livestock grazing may be used to manage fuel loads, thereby reducing the risk or incidence of wildland fire.

Fire plays an important and natural part in ecosystem function; however, the natural fire regime largely has been suppressed in the planning area. Although the suppression of the natural fire regime is considered an adverse impact to fire ecology, actions contributing to an increase in the incidence of wildland fires or limiting the ability to effectively fight wildland fires are considered adverse impacts to fire management. This analysis focuses on impacts to fire management. For example, actions limiting fire suppression tactics, thereby resulting in larger burn areas or more intense fires, would be considered adverse impacts. Conversely, actions contributing to a decrease in the incidence of resource damaging wildland fires or enhancing the ability to fight fires are considered beneficial impacts. For example, the use of unlimited tactics or full suppression may, in some cases, provide protection to a resource against potential fire damage, a beneficial impact. Regarding planned or prescribed fire, actions restricting the acreage or effectiveness of prescribed fire would be considered adverse. For example, stipulations to protect other resources (e.g., wildlife or livestock grazing) restricting or preventing prescribed burns from being conducted in certain areas or at certain times of the year are considered direct adverse impacts to prescribed fire management. Conversely, the lack of stipulations or actions increasing the acreage or effectiveness of prescribed fire would be considered a beneficial impact.

For the purpose of this analysis, short-term impacts to fire management and ecology include impacts occurring within 5 years. Long-term impacts are those remaining or occurring after 5 years. Impacts to fire management and ecology from alternatives are anticipated to be short- and-long term.

The following description of impacts is organized by three sections: unplanned/wildland fire, planned/prescribed fire, and rehabilitation following fire. The methods and assumptions, and analysis of alternatives sections are described under the first section only, unplanned/wildland fire, but apply to all three sections.

4.3.1 Unplanned/Wildland Fire

4.3.1.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Alternatives were evaluated based on a regional context of high fuel loadings and current management issues for all resource programs, as described in Chapter 3.
- Wildland fire in wildland-urban interface (WUI) areas typically will be suppressed with unlimited tactics.
- Some wildland fires that do not pose a threat to human life, private properties, or important resources can be used as a tool to reduce fuel loads and improve plant communities and wildlife habitats. The application of the appropriate management response to naturally-ignited wildland fires to accomplish specific resource management objectives and predefined designated areas is outlined in individual fire management plans.

- The *Eastern Wyoming Zone Fire Management Plan* (BLM 2004d) implements the fire management direction on BLM land within the planning area.
- Air quality currently is not affecting the ability to conduct prescribed burns; however, the more stringent air quality standards are, the more likely they affect ability to perform prescribed burns.
- Where livestock grazing occurs, it is BLM policy that prescribed burn areas be deferred or rested from grazing a minimum of two growing seasons. The deferment requirement of two growing seasons may be adjusted based on environmental conditions and management objectives consistent with Wyoming's standards for healthy rangelands.
- Compared to limited tactics, unlimited tactics would reduce the amount of acres burned annually, but increase the amount of surface disturbance from suppression activities and result in the need for more rehabilitation of damage caused by suppression activities. Unlimited fire suppression tactics also alter the condition class of the vegetation by preventing wildland fire to play its appropriate role in maintaining fire adapted ecosystems.
- Where native plants cannot be successfully reestablished, use of nonnative perennials in rehabilitation may be needed. Some nonnative grass species, such as Russian wildrye, increase the risk of wildland fire and could actually reduce it.
- Current BLM policy is to use certified weed-free native plant species seed for rehabilitation when reseeding is necessary.
- Annual bromes (e.g., cheatgrass) and INPS can elevate the risk of fire and actually alter the natural fire regime; therefore, alternatives contributing to the invasion and spread of INPS are anticipated to adversely impact wildland fire.
- In areas of cultural resource sensitivity, use of heavy equipment typically are limited to existing roads and trails, except where human safety is at risk.
- Cultural resource surveys are conducted, where applicable, for all prescribed burns, other fuel treatments, and rehabilitation.
- Current policy (BLM Manual 1745) requires use of native plant species for rehabilitation when they are available.

4.3.1.2 Analysis of Alternatives

Allowable uses and management actions with the potential to impact fire management and ecology generally can be characterized as either restrictions or proactive management actions associated with each alternative. The following analysis of alternatives describes potential impacts from alternatives in three sections: wildland fire, prescribed fire, and rehabilitation.

As fire management and ecology is affected by the alternatives, fire management and ecology can, in turn, impact other resources, including resource protection. Fires burning greater acreage for longer periods of time would emit more particulate matter into air. In addition to affecting public health and safety, fire can also affect rangeland health, wildlife habitat quality and quantity, and plant community health (refer to Map 19). The impacts of fire management and ecology on other resource topics (e.g., physical, biological, etc.) are discussed under the appropriate impacted resources.

Impacts Common to All Alternatives

The types and context of impacts anticipated for wildland fire as a result of the various alternatives are similar. Impacts to wildland fire from restrictions and proactive management actions, therefore, are described under individual alternatives.

Alternative A

Management actions regarding fire suppression are currently guided by decisions in the existing plan (BLM 1985a) and the *Eastern Wyoming Zone Fire Management* (BLM 2004d). Under Alternative A, priority is given to the use of unlimited tactics, except for a few cases. The existing plan contains a few restrictions on the use of heavy equipment and protection of bald eagle winter roosts. The other sites identified for protection are wagon ruts of the Oregon and Bozeman trails and elk crucial winter range, where there are limitations on the tactics that can be employed toward fire suppression. By default, unlimited fire management tactics can be used for all other types of areas, including WUIs, ROW, communication sites, riparian areas, and sites with highly erosive soils. No explicit fire guideline stipulating wildland fires may be allowed to burn to meet management objectives exists. Under this alternative wildfire use is not a management option.

Restrictions. Alternatives restricting fire suppression, fuels management, or wildland fire planning are anticipated to adversely impact wildland fire management. For example, except to protect human life, Alternative A does not allow use of heavy equipment to construct firelines in areas containing wagon ruts of the Oregon and Bozeman trails or in elk critical winter range. Moreover, to the extent possible, Alternative A also does not allow trees to be cut during fire suppression in bald eagle roost areas, unless a fire threatens human life or private property. These restrictions limit fire suppression and fire management.

Proactive Management Actions. For the Jackson Canyon ACEC, Alternative A designates all adjacent public lands as unlimited tactics and does not restrict road construction or grading. For the entire planning area, Alternative A develops wildland fire use plans on a case-by-case basis for those areas where a prescribed fire is planned. To implement the plan, a cooperative agreement with private land owners and other fire and land management agencies must be pursued. Fire management plans under Alternative A identify areas where grading of roads and (or) firebreaks are most needed for fire suppression, as well as areas where protection from wildland fires is most critical. Alternative A would use unlimited tactics of wildland fire in forestlands.

Alternative A manages wildland fire in accordance with a limited number of restrictions and specific proactive management actions. The restrictions in Alternative A are anticipated to have short- and long-term adverse impacts to wildland fire management. For example, the ability to construct and grade roads in the Jackson Canyon ACEC will facilitate fire containment and suppression. Conversely, use of unlimited tactics of wildland fire in forestlands may result in long-term buildup of hazardous fuels, thereby increasing the risk of catastrophic fire.

Alternative B

Restrictions. Similar to current management, Alternative B would not allow heavy equipment use in sensitive cultural resource areas, riparian/wetland habitats, big game crucial winter range, greater sage-grouse leks, and areas of highly erosive soils, except where human safety is at risk. For areas not identified as full protection, Alternative B would limit use of heavy equipment to existing roads and trails or immediately adjacent to them. In addition, Alternative B also prohibits tree cutting within 200 yards of identified bald eagle roosts during suppression activities. Restricting use of heavy equipment to existing roads and trails is expected to minimize impacts to soils and revegetation from fire suppression; however, this restriction is also anticipated to hamper fire suppression.

Alternative B would use full protection strategies in WUIs, developed recreation sites, and developed electronics sites. In all other areas, Alternative B will use appropriate management response strategies and tactics considering resource values at risk, proximity to private land, firefighting resource availability, and firefighter safety.

Proactive Management Actions. Alternative B would manage wildland fire and suppression in the Jackson Canyon ACEC in a manner similar to current management, except that road construction would not be allowed. For the entire planning area, Alternative B would develop wildland fire use plans as opportunities arise for public lands with aspen, juniper, and true mountain mahogany communities where contiguous public lands exceed 160 acres. Alternative B would allow natural ignitions within an area with a wildland fire use plan to burn to meet the desired management objectives. Cooperative agreements would be required in order to implement fire use on a landscape scale. Alternative B would utilize wildland fire to achieve desired future conditions for watershed stability and wildland habitat which is anticipated to benefit fire-adapted ecosystems in the planning area.

The restrictions associated with Alternative B are more restrictive than those identified in Alternative A; however, Alternative B's proactive management action to use wildland fire to achieve management objectives is anticipated to result in a beneficial impact to wildland fire management. The combination of more restrictions and beneficial actions for Alternative B are anticipated to have more overall benefits to wildland fire management relative to Alternative A.

Alternative C

Restrictions. Alternative C would have similar fire suppression and heavy equipment restrictions as Alternative B, except no full protection areas are identified under Alternative C.

Proactive Management Actions. Alternative C would manage wildland fire and suppression in the Jackson Canyon ACEC in the same manner described for Alternative B. The use of natural ignitions and wildland fire use plans would also be similar to Alternative B, except Alternative C would set the contiguous public lands minimum at 640 acres. Alternative C would use wildland fire in commercial forests to reduce fuel loads and (or) to satisfy stand prescriptions.

The lack of identified full protection areas will allow fire management more discretion with tactics and the allowable use of wildland fire is anticipated to benefit management objectives. The combination of restrictions and proactive management actions of Alternative C are anticipated to have more overall benefits to wildland fire management relative to Alternative A.

Alternative D

Restrictions. Alternative D would use full protection strategies and tactics across the entire planning area. Alternative D would employ similar fire management as described for current management, except grading of roads would not be allowed.

Proactive Management Actions. Alternative D would manage wildland fire and suppression in the Jackson Canyon ACEC in the same manner described for Alternative A. The use of natural ignitions and wildland fire use plans would also be similar to Alternative B, except Alternative D would set the contiguous public lands minimum at 1,280 acres, thereby limiting use of natural ignitions relative to alternatives B and C. Alternative D would suppress all wildland fire in commercial forests, which is expected to result in a buildup of hazardous fuels.

Alternative D would place fewer restrictions on wildland fire management; however, Alternative D would also limit, relative to alternatives B and C, the use of wildland fire to achieve management objectives. The use of full suppression throughout the planning area is anticipated to contribute to maintaining high fuel loads in the planning area, with an increased risk of high-intensity fire recurrence. Under Alternative D, consistent use of unlimited tactics is anticipated to decrease the number of acres burned annually during wildland fires compared to Alternative A. Overall, Alternative D is anticipated to have similar adverse impacts to wildland fire management relative to Alternative A.

Alternative E (Preferred Alternative)

Restrictions. Alternative E would restrict fire suppression tactics similar to Alternative B and be more restrictive than Alternative A. As in Alternative A, Alternative E would designate all federal properties adjacent to the Jackson Canyon ACEC as priority full suppression and identify areas where grading of roads and (or) firebreaks are most needed for fire suppression.

Proactive Management Actions. Alternative E would manage wildland fire and suppression in the Jackson Canyon ACEC in the same manner described for Alternative A. Alternative E would use natural ignitions and wildland fire to achieve management objectives similar to Alternative D; however, Alternative E would also use wildland fire in all forest stands to reduce fuel loads and (or) satisfy stand prescriptions. Using wildland fire for fuels management is a beneficial impact to fire management because it reduces the potential for high-intensity fire recurrence.

Alternative E would place restrictions on wildland fire management; however, it would also utilize wildland fire to achieve management objectives. Overall, Alternative E is anticipated to have less adverse and more beneficial impacts to wildland fire management relative to A.

4.3.1.3 Conclusion

The allowable uses and management actions for resources and resource uses are anticipated to result in a mix of beneficial and adverse impacts relative to wildland fire management. Based on a balance of restrictions and proactive management actions, Alternative E has the least adverse impact to wildland fire management. Although Alternative D has the least restrictions, the unrestricted full suppression tactics could result in a long-term adverse impact by contributing toward maintaining high fuel loads and a continuing high risk of wildland fires. Based on the potential for long-term impact, Alternative D has the most adverse impact to wildland fire management. Conversely, while alternatives B and C have the most restrictions, these restrictions could indirectly benefit fire management in the long-term because greater reliance on limited tactics is likely to result in a higher acreage of land burned during wildland fires, thus contributing toward a reduction of fuel loads. Overall, alternatives B and C are anticipated to have similar and more potential beneficial impacts to wildland fire management relative to Alternative A.

4.3.2 Planned/Prescribed Fire

Prescribed burning can be used to achieve measurable landscape-level or site-specific level objectives, such as reducing hazard fuel loads, creating diversity within vegetative communities, enhancing livestock management, improving wildlife habitat, regenerating decadent vegetative communities, and improving watershed health. It is anticipated that most of the prescribed burning in the planning area will occur in sagebrush and mountain shrub communities. Stipulations from other resources allowing or preventing prescribed burns to be conducted in certain areas or at certain times of the year are direct impacts to prescribed fire management.

4.3.2.1 Methods and Assumptions

Prescribed fire is a tool used to manage vegetative communities and can result in short-term adverse impacts, with long-term beneficial impacts to wildlife, wildlife habitat, and vegetative communities. (See also the Methods and Assumptions section for Unplanned/Wildland Fire.)

4.3.2.2 Analysis of Alternatives

Refer to the Analysis of Alternatives Section for Unplanned/Wildland Fire.

Impacts Common to all Alternatives

Approximately 20,000 acres of short-term disturbance are anticipated from prescribed fire within the planning area under any alternative (Appendix M). The short- and long-term impacts from prescribed fire are anticipated to be beneficial to fire management and ecology and to other resources; however, by removing existing vegetation and exposing soil, fire does provide an opportunity for the establishment of INPS. Smoke from fire temporarily degrades local air quality. Wind and other factors can cause prescribed fire to escape, becoming a wildland fire.

Where livestock grazing occurs, it is BLM policy that prescribed burn areas be deferred or rested from grazing a minimum of two growing seasons, with some exceptions based on environmental conditions and management objectives consistent with Wyoming's standards for healthy rangelands. Land ownership patterns in the planning area can impede the ability to conduct prescribed burns. Prescribed burns generally are not possible where domestic livestock producers are financially unable to withstand two growing seasons rest, as required by BLM policy. This policy may impact prescribed fire management because it restricts the ability to use prescribed fire as a management tool. Conflicting resource demands also can adversely impact prescribed fire management.

Alternative A

Under Alternative A, prescribed burns would continue to be decided by the BLM on a case-by-case basis. Conducting prescribed burns in big game crucial winter range would continue to require granting of an exception, either during the site-specific analysis or after consultation with the Wyoming Game and fish Department (WGFD) (in general, no surface disturbance is allowed in crucial big game winter range between November 15 and April 30).

Restrictions. Current management does not limit the use of prescribed fire on highly erosive soils. Prescribed fire currently is used to manipulate vegetation on areas identified for treatment in the range, forestry, and wildlife programs; however, Alternative A annually prohibits prescribed fire within bald eagle roosts from November 1 to March 31.

Proactive Management Actions. Current management does not specifically identify an integrated management approach to manage fuels in the planning area; therefore, prescribed fire is not integrated with mechanical, chemical, and biological techniques or with post-fire reseeding to reduce fuels and to protect high priority areas or resource values.

Alternative B

Restrictions. Unlike Alternative A, Alternative B would prohibit the use of prescribed fire on highly erosive soils. In addition, Alternative B would use prescribed fire to achieve measurable landscape level objectives identified for other resource programs, for reduction of hazardous fuels, and for reintroducing fire into fire adapted ecosystems.

Proactive Management Actions. Alternative B would use an integrated management approach to manage fuels in the planning area, including the use of prescribed fire; mechanical, chemical, and biological techniques; and reseeding. This approach would result in a beneficial impact to fire management in the planning area and is expected to result in more-effective reclamation and less INPS invasion relative to Alternative A.

Alternative C

Restrictions. Alternative C would limit the season and intensity of prescribed fire on highly erosive soils. Alternative C would use prescribed fire to achieve measurable landscape level objectives, the same

as Alternative B. These restrictions would provide additional benefits to prescribed fire management relative to Alternative A.

Proactive Management Actions. Alternative C would use an integrated management technique approach to manage fuels, the same as Alternative B. Use of the integrated management approach is expected to improve the effectiveness of prescribed fire and reclamation relative to Alternative A.

Alternative D

Restrictions. Similar to Alternative A, Alternative D would allow prescribed fire on highly erosive soils. Alternative D, similar to Alternative B, would use prescribed fire to achieve measurable landscape-level objectives.

Proactive Management Actions. Alternative D would use an integrated management technique approach to manage fuels, as would Alternative B. Using the integrated management approach is expected to improve the effectiveness of prescribed fire and reclamation relative to Alternative A.

Alternative E (Preferred Alternative)

Restrictions. Alternative E would limit the use of prescribed fire on highly erosive soils, as would Alternative C. Alternative E would use prescribed fire to achieve measurable 5th Order Watershed objectives, similar to Alternative B. These restrictions are anticipated to protect high priority areas and resource values.

Proactive Management Actions. Alternative E would use an integrated management technique approach to manage fuels, similar to Alternative B. Use of the integrated management approach is expected to improve the effectiveness of prescribed fire and reclamation relative to Alternative A.

4.3.2.3 Conclusion

Using prescribed fire to achieve measurable objectives for other resource programs and using an integrated management approach to manage fuels are anticipated to benefit prescribed fire management. All Action Alternatives are anticipated to have similar potential beneficial impacts to prescribed fire management and more potential beneficial impacts relative to Alternative A. Benefits include protecting high-priority areas and resource values; improving the effectiveness and timeliness of reclamation; and reducing the potential for resource conflicts related to using prescribed fire.

4.3.3 Rehabilitation

Rehabilitation (contour-felling, mulching, seeding, and control of invasive plants) can be required following fires and following fire-suppression activities. The spread of cheatgrass, in particular, is possible in areas that have been burned or disturbed due to fire-suppression activities. Widespread presence of cheatgrass can alter the local fire regime and fire-recurrence interval. Resource management actions with the potential to restrict rehabilitation efforts are primarily the wildlife and cultural resources programs. Impacts are measured by the ability to conduct rehabilitation efforts and the potential for rehabilitation success. Restrictions to rehabilitation are considered a direct adverse impact. Indirect impacts could occur where rehabilitation introduces a long-term risk of recurrent fire, requiring new rehabilitation efforts.

4.3.3.1 Methods and Assumptions

Refer to the Methods and Assumptions section for Unplanned/Wildland Fire.

4.3.3.2 Analysis of Alternatives

Refer to the Analysis of Alternatives section for Unplanned/Wildland Fire.

Impacts Common to all Alternatives

The types and context of impacts anticipated for rehabilitation as a result of the various alternatives are similar. Impacts to rehabilitation from restrictions and proactive management actions, therefore, are described under individual alternatives.

Alternative A

Under Alternative A, no specific restrictions or guidelines concerning rehabilitation and stabilization following wildland fires exist; rehabilitation is conducted on a case-by-case basis. Since there are no specific requirements for rehabilitation, this approach is anticipated to limit rehabilitation success and allow the invasion of INPS.

Alternative B

Alternative B would rehabilitate suppression related damage, including the use of chemical treatments where INPS are present. This alternative would focus on suppression-related damage only, and not on rehabilitation of areas affected from fire severity. Since rehabilitation will be required where suppression-related damage occurs, this would increase the potential for rehabilitation success relative to Alternative A.

Alternative C

Alternative C would rehabilitate all fires on public lands, including damage from suppression activities and fire severity and use chemical treatments where INPS are present. This alternative would require all fires to be rehabilitated, as well as increase the potential for rehabilitation success relative to Alternative A and relative to B.

Alternative D

Alternative D would evaluate all fires and rehabilitate as needed for suppression and fire-severity impacts. Rehabilitation could include chemical treatment where INPS are present. This alternative is similar to Alternative A, except all fires have to be evaluated for rehabilitation. This approach is more realistic as all fires do not need rehabilitation. This approach would increase the potential for rehabilitation success, as all fires would be evaluated and rehabilitation conducted as determined by the resource staff. This approach is not limited to suppression damage and fire-severity damage; it also looks at both types of rehabilitation concerns.

Alternative E (Preferred Alternative)

Alternative E would evaluate all fires and rehabilitate as described for Alternative D. This would increase the potential for rehabilitation success relative to Alternative A.

4.3.3.3 Conclusion

The specified management actions for alternatives B, C, D, and E are anticipated to have a beneficial impact to rehabilitation efforts relative to Alternative A. Alternative C has the most beneficial impact due to the anticipated rehabilitation of all fires and suppression activity impacts. Alternative C requires all

fires be rehabilitated, which is not always necessary or practical. Alternative B is similar to Alternative C, except damage caused from suppression-related actions only will be rehabilitated. Alternatives D and E have similar beneficial impacts, but less than alternatives B and C because the requirement to rehabilitate areas disturbed by fires and associated suppression activities is evaluated on a case-by-case basis. Although alternatives B and C are the most beneficial by rehabilitating all fires, alternatives D and E only rehabilitate damaged areas when deemed necessary. Overall, the order of alternatives in descending order of most to least beneficial impacts to rehabilitation is C, B, E, D, and A.

4.4 Biological Resources

This section describes compliance with the Endangered Species Act (ESA) for special status species as well as the anticipated environmental consequences (i.e., impacts) each alternative could have on habitat fragmentation and biological diversity. The potential environmental consequences to individual biological resources (i.e., vegetation, fish, wildlife, and special status species) are described following the Habitat Fragmentation and Biological Diversity section.

Special Status Species

Section 7 of the ESA requires Federal agencies (such as BLM) address impacts on species listed under the Endangered Species Act (ESA) through consultation with the USFWS. Informal conferencing and consultation with the USFWS occurs for authorized federal activities that potentially affect habitats for endangered, threatened, proposed, and candidate species within the planning area (USFWS 2003b). As part of informal consultation, the BLM's Casper Field Office receives an annual list of species listed or proposed for listing as threatened or endangered.

Casper's Biological Assessment (BA) for the Draft EIS analyzes the potential affects of the proposed alternative on those species listed as threatened or endangered and occurring in the planning area (BLM 2006a). Habitat conservation measures identified in the BA are applied to surface-disturbing and disruptive activities, as appropriate to protect species listed as threatened or endangered. In addition, surveys for threatened and endangered species on federal land or on split estate land are conducted in potential habitats prior to approval of projects or activities that could impact these species. Reasonable and prudent measures and terms and conditions identified in Statewide Programmatic BAs and Biological Opinions (BOs) for listed plant and wildlife species within the planning area, will also be implemented as appropriate.

Habitat Fragmentation and Biological Diversity

Habitat fragmentation and biological diversity are not resources or resource uses, rather, they are conditions within the planning area that can be impacted by BLM management actions and allowable uses as expressed in the alternatives (see Chapter 2). As such, habitat fragmentation and biological diversity are described immediately following this introduction and prior to the descriptions of anticipated impacts to individual biological resources. Habitat fragmentation is anticipated to continue and incrementally increase in the future commensurate with surface-disturbing activities and associated development. Of particular concern is oil and gas leasing in areas with relatively large blocks of contiguous habitat. An oil and gas lease grants the lessee the "right and privilege to drill for, mine, extract, remove, and dispose of all oil and gas deposits" in the leased lands, subject to the terms and conditions incorporated in the lease (BLM Form 3100-11, Lease for Oil and Gas). Because the Secretary of the Interior has the authority and responsibility to protect the environment within federal oil and gas leases, restrictions are imposed on the lease terms.

The Tenth Circuit Court of Appeals in Sierra Club vs. Peterson (717F.2d 1409, 1983) found that "on land leased without an NSO stipulation, the DOI cannot deny the permit to drill…once the land is leased the DOI no longer has the authority to preclude surface-disturbing activities even if the environmental impact of such activity is significant. The Department can only impose mitigation upon a lessee who pursues surface-disturbing exploration and/or drilling activities." The court goes on to say "notwithstanding the assurance that a later site-specific environmental analysis will be made, in issuing these leases the DOI has made an irrevocable commitment to allow some surface-disturbing activities, including drilling and road building." For these reasons and to minimize habitat fragmentation, large blocks of contiguous habitat with low oil and gas development potential are closed (i.e., deferred from) to oil and gas leasing in alternatives B, C, and E.

The extent or intensity of fragmentation is expected to vary by alternative. The extent of fragmentation under each alternative is primarily anticipated to be a function of the amount of long-term surface disturbance in the planning area and proactive management actions anticipated to minimize fragmentation.

Management challenges regarding habitat fragmentation and future management of the planning area include balancing the requirement for multiple use and sustained yield with management of a diversity of resources and resource uses that sometimes conflict. These challenges are complicated by the intermingled public and private ownership pattern that exists within the planning area and the relatively small and isolated tracts of BLM-administered surface found in the eastern part of the planning area comprising Converse, Goshen, and Platte counties. On the other hand, relatively large blocks of contiguous habitat are in the planning area west of Casper and I-25 in Natrona County. Future challenges regarding habitat fragmentation include managing the location and constructing, maintaining, and operating infrastructure required for mineral, energy, transportation, and other development, all while adhering to habitat requirements of wildlife and special status species occurring in the planning area. Additional management challenges in the planning area include controlling the spread of INPS; managing fire suppression and rehabilitation activities; and integrating activities of resources affecting habitat fragmentation. Management actions anticipated to address the challenges of habitat fragmentation are included as part of the alternatives (primarily vegetation) described in Chapter 2.

Under all alternatives and for the life of the plan, biological diversity is anticipated to remain within the range of conditions bounded by the current situation; however, the rate of change in biological diversity is anticipated to vary by alternative. Allowable uses and management actions primarily anticipated to impact biological diversity are described below under the topics of surface-disturbing activities, proactive management actions, fire management and ecology, and INPS.

Actions affecting biological diversity include BLM-authorized actions within the planning area, as well as external actions beyond the control of the BLM. External factors influencing biological diversity include changes to the natural fire regime, urbanization (e.g., WUI), agricultural conversion of rangelands, INPS, and energy development. Maintaining the diversity and distribution of habitats within the planning area is complicated by existing conditions of land ownership, lack of a natural fire regime, conflicting land use, INPS, WUI, and habitat fragmentation. The impacts of potential habitat changes on wildlife and special status species are discussed under Fish and Wildlife Resources and Special Status Species elsewhere in this chapter.

Surface-disturbing Activities. Surface-disturbing activities on BLM-administered land varies with the alternatives. Under Alternative A, surface-disturbing activities are evaluated on a case-by-case basis and are allowed on highly erosive soils. In addition, except for the South Bighorns, surface disturbance and occupancy are currently allowed on slopes greater than 25 percent with the BLM authorized officer's permission. Alternative D allows surface-disturbing activities on highly erosive soils. Such activities are either restricted or not allowed under the other three action alternatives. Alternative B places an NSO restriction on highly erosive soils, while alternatives C and E require that surface- disturbing activities be modified (located) to avoid areas of highly erosive soils to the greatest extent practicable. Under all alternatives, guidance BMPs are applied to minimize impacts of surface-disturbing activities, whether they are on highly erosive soils or not. As shown in Table 4-1, projected long-term surface disturbance is lowest for Alternative B and approximately double for the other alternatives. The actions proposed under alternatives B, C, and E to address fragmentation of habitat indirectly reduce the amount of surface disturbance occurring in contiguous blocks of native vegetation in the planning area.

In general, surface-disturbing activities are anticipated to result in long-term loss, degradation, and fragmentation of habitats, thereby impacting biological diversity of the planning area. Construction of

well pads and roads, pits and reservoirs, and pipelines and powerlines; mining; and vegetation treatments are the kinds of surface-disturbing activities anticipated in the planning area. Surface disturbance associated with permanent linear infrastructure (roads) is anticipated to have the greatest adverse impact on habitat fragmentation. Alternative B is expected to have the least miles of linear features of all alternatives (Appendix M).

Proactive Management Actions. Table 2-3 describes proposed management actions (see Vegetation) for addressing habitat fragmentation in accordance with the different alternatives. Map 20 shows the spatial extent of these proposed management actions. Current management does not specifically address habitat fragmentation; likewise, management actions to address habitat fragmentation are not proposed for Alternative D. Alternative B proposes to address the challenge of habitat fragmentation by retaining intact blocks of native vegetation where contiguous acreage of more than 10,000 acres is present, the development potential for coal and oil and gas are low, and public ownership exceeds 50 percent. Alternative B closes all BLM-administered mineral estate within these areas to oil and gas leasing and geophysical operations on public land surface. These areas also would be closed to renewable energy development on public surface. Moreover, this management action withdraws the areas from the operation of public land laws related to locatable minerals and closes the area to mineral material disposal. Alternatives C and E propose similar management actions with different restrictions covering less acreage. The area of BLM-administered surface managed as intact blocks of native vegetation is 413,552 acres under Alternative B, 177,035 acres under Alternative C, and 131,879 acres under Alternative E.

Fire Management and Ecology. Wildland fire and prescribed burns could impact biological diversity and are anticipated to result in similar adverse short-term impacts to habitat; however, the long-term benefits of fire, especially prescribed fire, are generally anticipated to improve the quality of habitat types and contribute to the maintenance of biological diversity. The lack of a natural fire regime is the primary fire ecology factor impacting biological diversity. Over time, lack of a natural fire regime is anticipated to reduce biological diversity in the planning area. Current management does not specifically address lack of a natural fire regime; however, it does utilize prescribed fire to manipulate vegetation to achieve resource objectives. All Action Alternatives propose to utilize prescribed fire to achieve measurable objectives for resource management, reduce hazardous fuels, and reintroduce fire into fire-adapted ecosystems within the planning area.

INPS. To various degrees, INPS are anticipated to continue to spread within the planning area under all alternatives. The spread of INPS is anticipated to contribute to the loss, degradation, and fragmentation of habitats, as well as to the reduction of biological diversity over time.

Conclusion. The conditions of habitat fragmentation and biological diversity are anticipated to be impacted by current management and by management actions proposed as part of Action Alternatives. Overall, habitat fragmentation is anticipated to have adverse impacts on biological diversity and biological resources. The primary factors impacting habitat fragmentation in the planning area are surface-disturbing activities that break blocks of habitat into smaller units and proactive actions to avoid or minimize fragmentation. The primary factors impacting biological diversity in the planning area are surface disturbance, fire management and ecology, INPS, and habitat fragmentation. Considering these factors, Alternative B is anticipated to contribute the least to habitat fragmentation and have the least adverse impact to biological diversity. For the same reasons, alternatives A and D are anticipated to contribute the most to habitat fragmentation and have the greatest adverse impact to biological diversity. Alternatives C and E are anticipated to result in similar habitat fragmentation, albeit more than Alternative B, but less than alternatives A and D. Likewise, alternatives C and E are anticipated to maintain similar conditions of biological diversity, including less adverse impacts than under alternatives A and D, but more than under Alternative B.

4.4.1 Vegetation – Forests, Woodlands, and Forest Products

Actions occurring through implementing each alternative could affect forests, woodlands, and forest products. This section describes the impacts each alternative has on forests, woodlands, and forest products in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts are described as beneficial or adverse with respect to forests, woodlands, and forest products. Refer to Map 21 for forest and woodland resources.

Actions restricting forest management practices or contributing to the decline in abundance, distribution, or health of forests, woodlands, and the availability, quality, and quantity of forest products are considered adverse impacts. Indirect impacts include any change in the forest and woodland species, vigor, health, site quality, and vegetative community type as a result of natural forces (e.g., insect and disease, fire, and drought conditions), management actions from other resources, or failure to implement management actions. Conversely, beneficial impacts include actions that enhance management, improve health, and protect and restore forests and woodlands in the planning area. For the purpose of this analysis, a short-term impact is one that is apparent within a 5 year period. A long-term impact is one that persists for more than 5 years.

Both natural and human activities could produce beneficial or adverse impacts to the forest and woodland communities. Natural regeneration is an example of this. In an old growth forest, natural regeneration restores genetic diversity, sustained yield, and an uneven-aged stand to benefit continuous production, insect and disease control, and produce economic benefits by proper land utilization, soil and water conservation, and eliminating the cost of planting. Alternatively, natural regeneration can introduce conifers into aspen stands thereby reducing the size of or out competing the aspen stand.

4.4.1.1 Methods and Assumptions

Methods and assumptions used in this analysis include the following:

- No current forest or woodland inventory or age and species classifications are available for the planning area.
- The condition, species content, and vitality of the forest and woodland ecosystem rest on the foundation of the soils, topography, slope/aspect, microclimate and climatic forces specific to the region.
- Forest and woodland management treatments promote forest and woodland preservation, production, health, and value.
- Distributing and managing vegetative treatments will vary in forest and woodland areas depending on the desirable goals (e.g., fuel reduction in a WUI area).
- Livestock grazing in forests and woodlands generally remain compatible with forest management under all alternatives; many forests and woodland areas are inaccessible to livestock due to steep slopes, physical barriers, or proximity to other portions of grazing allotments.
- Old growth stands or those to be managed for old growth will follow the HFRA (2003) Section 102 for maintaining and managing these stands.

4.4.1.2 Analysis of Alternatives

Allowable uses and management actions potentially impacting forests, woodlands, and forest products primarily include surface-disturbing activities and proactive management actions.

As forests, woodlands, and forest products are impacted by the alternatives, forests, woodlands, and forest products can, in turn, impact other resources. The impacts of forests, woodlands, and forest products on other resource topics (i.e., physical, biological, fire management and ecology, etc.) are discussed under the appropriate impacted resource section in this chapter.

Impacts Common to All Alternatives

The types of impacts projected to occur to forests, woodlands, and forest products as a result of the various alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative. Therefore, impacts to forests, woodlands, and forest products from surface-disturbing activities and proactive management actions are described under individual alternatives. The following paragraphs provide a general description of potential impacts to forests, woodlands, and forest products not anticipated to differ among alternatives.

Potential air quality restrictions on vegetative treatments vary depending on air quality conditions within the immediate area at the time of proposed treatments. Potential short-term adverse impacts to vegetative treatments include planning and timing restrictions to minimize emissions associated with fugitive dust or smoke.

Direct long-term adverse impacts to forest management occur in localized areas where new cultural resource sites are discovered. While not typically found in forested areas, cultural sites could restrict location of vegetative treatments and access roads, thus decreasing the accessibility and the forest acreage available for treatments. However, it should also be noted that the size of a cultural site is only a small percentage of the total acreage involved.

Potential impacts from VRM classifications, soil and water resources, air quality, INPS, NHTs and Other Historic Trails, transportation, OHV use, wildlife, and special status species are anticipated to influence the size and shape of forest and woodland treatments and restrict the location and construction of access roads. Silviculture treatments in forests and woodlands (e.g., burning for regeneration purposes) defers livestock grazing for two growing seasons to allow for regeneration (BLM 2004d).

Recreation use within forestlands could result in indirect short-term adverse impacts from accidental fires, unauthorized woodcutting within and adjacent to campgrounds, and degradation of vegetation along trails and roads. Unless properly designed and managed, development of recreational trails, both motorized and nonmotorized, could have an adverse impact on forests and woodlands by eroding soil. Increased development of nonmotorized and motorized trails and trailheads could increase recreational use and associated impacts to forestlands over time.

The development of wind-energy sites is anticipated to have a localized, but direct, adverse impact on forestlands and forest management activities for all alternatives. Development of facilities and infrastructure associated with wind energy, transportation networks, minerals, reservoirs, and recreation are anticipated to increase habitat fragmentation in the planning area and remove forest acres available for management.

Short-term impacts regarding the timing or location of vegetative treatments result from temporary CSU restrictions, seasonal NSO restrictions, or no surface development restrictions within buffers for special status species, raptors, and bald eagle roost sites located within forests and woodlands. In addition, a seasonal restriction on forest management occurs under all alternatives for the Jackson Canyon ACEC. These restrictions may apply to newly developed and existing ACECs and SMAs.

Fragmentation of forests and woodlands could increase depending on the forest prescription applied; however, this impact is anticipated to be minimal because regeneration of treated areas would create

forest and woodland diversity and age-class diversity. In addition, a direct long-term impact to forest lands by the disposal of forest lands located within 5 miles of subdivisions and (or) communities is anticipated.

Alternative A

Surface-disturbing Activities. Under Alternative A, 1,000 acres of short-term surface disturbance is projected for prescribed burning and silviculture treatments in forest and woodlands. Short-term surface disturbance is anticipated to increase the potential for short-term adverse impacts to soil erosion, water quality, and INPS; however, the relatively small size of treatment areas and the use of BMPs are expected to minimize these short-term impacts. The long-term benefits from prescribed burning and silviculture treatments will outweigh the short-term impacts by reducing the fire hazard through fuel removal, increasing opportunities for natural regeneration, and controlling insects and disease. In the long term, the current practice of using full suppression to control wildland fire is expected to contribute to the increase in fuel loads, thereby increasing the risk of more intense and possibly catastrophic fires.

Proactive Management Actions. Current forest and woodland management is directed at ponderosa pine and lodgepole pine composition in the 17 Forest Management Areas (FMAs) and intended to compliment harvest and stand vigor. All silviculture treatments are available for use under current management. At least 50 percent of the lodgepole and ponderosa pine volume will be cut using select cutting or clear-cutting. This includes the immature stands, overmature trees, and trees infested with insects and (or) disease. Clear-cutting 3 to 5 acres would provide for natural regeneration; artificial regeneration would occur if there is insufficient or no natural regeneration. Management actions are anticipated to benefit these communities by improving the overall condition of these stands and enhancing age and species diversity.

Under Alternative A, 17 FMAs are inventoried and classified. Once the inventory is complete, 17 forest management plans will be written and treatments developed to address site-specific forest conditions. Current management focuses on the ponderosa and lodgepole pine stands in these areas. An estimated 600 thousand board feet (MBF) would be harvested annually on 50 to 1,000 acres.

Forest management objectives in the Jackson Canyon ACEC include hazard reduction, timber stand improvement, and insect- and disease-control treatments. Sales of forest products are limited to individual and small harvesting operators. The site has seasonal restrictions for the bald eagle roost and transportation currently is limited to existing roads and trails.

Thinning practices will continue in the Muddy Mountain EEA as needed with approximately 200 MBF harvested annually in the next 5 years and then 25 MBF annually thereafter. These silvicutural treatments will benefit insect and disease control, fuel reduction for the protection of recreation areas, and the health and vigor of forest stands.

The forest products market also plays a vital role in assuring the removal of the sawtimber, post and poles, firewood, and hobby wood. Removing a portion of the forest and woodlands by selective harvest allows for a reduction in hazardous fuels and protection against wildland fires.

Big game habitat in forested areas requires more intensive management, which could alter the forest management plans; however, forest and woodland management practices generally compliment and improve habitat for elk and mule deer. Seasonal stipulations limit some management practices, such as forest management operations.

Forest and woodland treatments could be reduced and (or) prohibited in portions of the SMAs. Restriction on treatments could reduce commercial harvest, accessibility, and vegetative management for the benefit

of forest and woodland health and fire protection (i.e., fuel reduction). The aspen and woodland communities (limber pine and juniper) will be inspected, and the actions to achieve the properly functioning condition will be implemented on a case-by-case basis.

Alternative B

Surface-disturbing Activities. Anticipated impacts under Alternative B for surface-disturbing activities are expected to be similar in nature but 400 acres less (600) than under Alternative A for prescribed fire and silviculture treatments in forests and woodlands. However, Alternative B results in the lowest acreage (600) of silvicultural treatments relative to all other alternatives.

Proactive Management Actions. Under Alternative B, forestlands are inventoried and classified as commercial forestland or noncommercial woodland. Forests are managed primarily for watershed stability, wildlife habitat, and recreation, with an emphasis on forest age diversity, species vitality, and genetic diversity.

Ponderosa pine in Esterbrook, Jackson Canyon, and Little Red Creek are managed as old growth forest. Prescribed burns and harvest are designed to thin new growth, maintain old growth, and maintain desired understory. Wildland fire is utilized as a tool to achieve desired conditions for watershed stability and wildlife habitats unless it poses a risk to forest stands or recreation infrastructure. Silviculture treatments proposed are the same as in Alternative A, with the exception of two different management schemes. Insect and disease infestations are allowed to run their natural course and clear-cuts would be smaller than five acres with meandering boundaries. The lack of any attempts to eradicate or control insect and disease damage produces high fuel loading and does not conform to the fire plan, resulting in increased fragmentation due to increased tree mortality areas.

Silvicultural treatments will be applied, as needed, to achieve objectives in the aspen and woodland communities. Alternative B proposes to manage the same acreage of aspen (2,822) as Alternative A, but toward DPC per criteria defined in the Aspen Ecosystems Objectives for sustaining biological diversity. Unlike Alternative A, all harvesting slash or forest and woodland residues resulting from silvicultural treatments or natural elements are scattered, piled and burned, or chipped onsite to eliminate fuel loading.

Forest management in the Jackson Canyon ACEC is similar to Alternative A and places restrictions on commercial harvest. For example, only existing roads and trails could be used to haul wood products, thereby limiting the effectiveness and efficiency of operations.

Management of the 1,419-acre Muddy Mountain EEA continues in accordance with the Forest Plan established in 2001 and emphasizes benefits to recreation use and wildlife habitats. Casual harvest up to 100 MBF occurs where recreation and wildlife objectives are met.

Alternative C

Surface-disturbing Activities. Anticipated impacts under Alternative C for surface-disturbing activities are expected to be similar in nature, but 600 acres more (1,600) than under Alternative A for prescribed fire and silviculture treatments in forests and woodlands. Alternative C treats 600 more acres with silviculture treatments relative to other alternatives.

Proactive Management Actions. Forest and woodlands are managed to achieve a sustainable flow of wood products. Forest and woodlands are classified as commercial or noncommercial by inventories and classification systems. Sanitation cuts are used to control blister rust, dwarf mistletoe infestations, and insect infestations from becoming epidemic.

The forest units in Esterbrook, Little Red Creek, and Jackson Canyon receive the same management as in Alternative A; however, there is opportunity to develop roads and trails to aid in the removal of forest products and to support forest management practices. The silvicultural treatments supported in Alternative A are the same for this alternative, with the exception of the size of the clear-cuts changing to 20 acres or less with meandering boundaries. Ingress and egress are addressed on a case-by-case basis with lands having legal access taking the lead on forest management opportunities. Any isolated forest and woodland tracts utilize cooperative agreements with landowners for ingress and egress.

All opportunities to utilize wildland fire in commercial forest stands to reduce fuel loads will be taken, resulting in improved forest and woodland health in fire-dependent ecosystems.

The development of recreational trails, both motorized and nonmotorized, could have an impact on the forest and woodlands by creating soil and water erosion. Additional impacts could include damage to the vegetation, and public intrusion that creates litter, damage from campfires, and indiscriminate tree cutting.

The Muddy Mountain EEA will continue forest and woodland management practices as in Alternative B, with an annual harvest of 100 MBF.

As biomass markets are developed, slash and fuels created with the silvicultural treatments will be utilized, scattered, or burned to prevent fuel accumulations and will compliment fire-management plans.

Silvicultural treatments will be applied, as needed, to achieve objectives in the aspen and woodland communities; however, a smaller percentage (50% of Alternative B) of the aspen communities will be managed for desired plant community (DPC). Vegetation mosaics will be created with woodland and adjacent plant communities. Woodlands that provide thermal cover for elk and mule deer will be retained and allowed to expand, benefiting big game winter ranges but also present encroachment problems in parks and grasslands.

Alternative D

Surface-disturbing Activities. Anticipated impacts under Alternative D for surface-disturbing activities are expected to be similar in nature, but impact more acreage than under Alternative A for prescribed fire, silviculture treatments, and vegetation mechanical treatments in forests and woodlands. Alternative D treats 2,200 more acres with silvicultural treatments relative to Alternative A, the most of any alternative.

Proactive Management Actions. Under Alternative D, overall conditions of the forest and woodland stands improve by placing emphasis on tree growth and production of forest products. As in the other alternatives, these stands are inventoried and classified. The ponderosa pine stands receive the benefit of a full range of silvicultural treatments and are managed as commercial forest. Forest and woodlands continue to increase in size, as there will be no management taken to disallow encroachment. No silvicultural treatments will be applied to the aspen and woodland communities.

Aspen stands continue to diminish and degrade, as there will be no active management of these stands, which must regenerate from suckers and sprouts. This would have an impact on wildlife habitats, VRM, soils and water conservation, fire plans to utilize aspen as a fire break, species diversity for forest and woodland health, and habitat fragmentation. Alternative D also utilizes an integrated management technique approach to reduce hazardous fuels in commercial timber areas.

Forestlands are inventoried and classified as commercial forestland or noncommercial woodland under Alternative D rather than in the 17 FMAs as described for Alternative A. Forests and woodlands are managed to achieve maximum wood growth and flow of wood products. Under Alternative D, overall conditions of the forest and woodland stands would be improved by placing the emphasis on tree growth

and production of forest products. Under Alternative D, there also would be fewer old growth forest and wildlife habitat improvements than under alternatives B or C.

The Muddy Mountain EEA will continue forest and woodland management practices as in Alternative A, with an increase in annual harvest after the first 5 years. The amount of the annual harvest would then be 100 MBF per year. Prescribed burns and the increased harvest decrease fire fuels and, therefore, protect the timber stands and recreational areas.

Ponderosa pine in Esterbrook, Jackson Canyon, and Little Red Creek are managed to achieve a maximum flow of wood products. Forest management in the Jackson Canyon ACEC would differ from Alternative A by maximizing harvest of wood products within bald eagle roost areas (nonroosting periods only). Commercial harvest of wood products would be allowed to construct necessary roads and trails to remove forest products.

Alternative D proposes to manage 25 percent (706 acres) of the aspen acres identified in Alternative A, but toward DPC per criteria defined in the Aspen Ecosystems Objectives for sustaining biological diversity. Woodland encroachment is not treated under Alternative D, which could increase the size of forests and woodlands. No silvicultural treatments are applied to aspen stands or other woodlands. Aspen stands, therefore, are anticipated to continue diminishing and degrading with anticipated adverse impacts to wildlife habitats, VRM, soils and water conservation, fire management, species diversity for forest and woodland health, and habitat fragmentation. Unlike Alternative A, biomass generated from silviculture treatments would be utilized.

Similar to Alternative A, forest and woodland management practices for the Muddy Mountain EEA continue; however, Alternative D accelerates harvest after the first 5 years to 100 MBF per year, thereby providing additional benefit to the forestry program compared to Alternative A. Accelerated harvest is anticipated to reduce fuel loads and improve overall stand health compared to Alternative A.

Alternative E (Preferred Alternative)

Surface-disturbing Activities. Anticipated impacts under Alternative E for surface-disturbing activities are expected to be similar in nature, but 600 acres more (for a total of 22,100) than under Alternative A for prescribed fire, silviculture treatments, and vegetation mechanical treatments in forests and woodlands. Alternative E treats the same acres as Alternative C.

Proactive Management Actions. The forest and woodlands are managed to achieve a sustainable flow of wood products, with the forest being the primary resource. The forest and woodlands also are managed for multiple uses (i.e., watershed health, and stability, wildlife, recreation, livestock grazing, etc.). The forest and woodlands are inventoried and classified, and an active forest management program is implemented to achieve desired health conditions and a sustainable flow of wood products. Insects and diseases would become endemic rather than epidemic.

Ponderosa pine stands are managed to achieve a sustainable flow of products, and silvicutural treatments (i.e., burning, thinning, etc.) are implemented to maintain health and achieve the desired overstory and understory. Wildlife trees and snags are encouraged in these stands, especially in the bald eagle roost. In the Jackson Canyon ACEC, individual and small contractors complete forest-management activities and rehabilitate all roads and trails.

The entire array of silvicultural treatments will be utilized to manage the forest and woodlands, including prescribed burning, harvesting (thinning, clear-cutting, shelterwoods, seed-tree cuts, release cuts), herbicide and insecticide treatments, planting, and seeding. Clear-cuts will be less than 20 acres with meandering boundaries. The larger clear-cut units and the lack of suppression of fires are anticipated to

cause temporary fragmentation of the vegetation, but natural and artificial regeneration would eventually revegetate these areas. Access to forest and woodlands will be determined on a case-by-case basis.

Fire will not be suppressed where it will benefit forest and woodlands and replicates the natural fire regimes of the ecosystem. Contrary to current management, Alternative E utilizes wildland fire in all forest stands to reduce fuel loads and (or) satisfy stand prescriptions, thereby improving forest and woodland health in fire-dependent ecosystems.

Forest stands within the Muddy Mountain EEA will be managed according to the forest plan with an annual harvest of 100 MBF. Aspen stands will be restored with management actions specific for the species. The overall management of the forest will benefit recreational and educational activities.

Silvicultural treatments will be applied, as needed, to achieve objectives in the aspen and woodland communities. Vegetation mosaics will be created with woodland and adjacent plant communities. Woodlands that provide thermal cover for elk and mule deer will be retained and allowed to expand, which will benefit big game winter ranges. Livestock grazing and big game browsers and grazers may be restricted in stands that have been burned and are regenerating.

Alternative E utilizes aspen communities to the greatest extent possible as natural fire breaks in WUI areas and wildlife habitats. Unlike Alternative A, Alternative E utilizes a combination of management practices to reduce hazardous fuels in commercial timber areas.

Alternative E proposes to manage the same acreage of aspen (2,822 acres) as Alternative A, but toward DPC per criteria defined in the Aspen Ecosystems Objectives for sustaining biological diversity. Aspen stands will be restored; however, woodland encroachment in other vegetative types will be treated to protect other resource values. Silvicultural treatments are applied, as needed, to achieve objectives in the aspen stands and woodlands. Vegetation mosaics are created with woodlands and adjacent plant communities. Woodlands that provide thermal cover for elk and mule deer are retained and allowed to expand. Unlike Alternative A, slash and fuels created by silviculture treatments are utilized where biomass markets are available, or scattered or burned to prevent fuel accumulations complimenting fire management plans. Management of the 1,419-acre Muddy Mountain EEA continues in accordance with the Forest Plan established in 2001 as described for Alternative C.

4.4.1.3 Conclusion

The types of surface disturbance are anticipated to be similar for all alternatives with the primary difference attributed to the acres of silviculture treatments. All alternatives adhere to the Healthy Forests Restoration Act of 2003, the Healthy Forests Initiative and the 10 Year Comprehensive Strategy. Alternative B treats the least acreage (600 acres), followed by Alternative A (1,000 acres), alternatives C and E (1,600 acres), and Alternative D (3,200 acres). It is anticipated that silviculture treatments will benefit forest and woodland health, including insect and disease control and fuel reduction. The lack of any control actions for insect and disease damage proposed by Alternative B is anticipated to increase fuel loading, thereby increasing the risk of wildfire and insect epidemics relative to other alternatives. However, the use of wildland fire to achieve objectives in commercial forests under alternatives B, C, and E are anticipated to reduce fuel loads and benefit forests, woodlands, and wood products in the long term relative to alternatives A and D. Management of aspen communities toward DPC also is anticipated to benefit forests, woodlands, and wood products, with the most potential benefit anticipated from alternatives B and E. Restrictions to protect other resource values are anticipated to adversely impact forests, woodlands, and wood products the most under Alternative B and the least under alternatives A and D.

The anticipated adverse impacts from treating fewer acres silviculturally under Alternative B are partially offset by the anticipated benefits of greater INPS control and fire-management actions under Alternative B relative to alternatives A and D. In addition, Alternative B's restrictions on surface disturbance in areas of highly erosive soils, slopes greater than 25 percent, and reclamation requirements are anticipated to conserve soils and site quality more so than alternatives A and D.

Meaningful differences in surface-disturbing activities and reclamation, silviculture treatments, insect and disease control, restrictions by other resources and resource uses, and fire management and ecology actions form the following conclusion: Impacts to forests, woodlands, and forest products are anticipated to be the least adverse under Alternative E and the most adverse under Alternative B. Adverse impacts to forests, woodlands, and forest products under alternatives C and D are expected to be similar but less than Alternative A.

4.4.2 Vegetation – Grassland and Shrubland Communities

Actions that contribute to the decline in abundance or distribution of grassland and shrubland communities are considered adverse impacts. Conversely, beneficial impacts to grassland and shrubland communities include actions that protect or restore these communities in the planning area.

Direct impacts to grassland and shrubland communities result from surface-disturbing and other activities that result in vegetation removal and mechanical damage to plants. Surface-disturbing activities are generally considered an adverse direct impact to grassland and shrubland communities. Activities such as livestock grazing, wildlife use, wildland fire and vegetative treatments (e.g., prescribed fire, chemical, or biological) also have direct impacts on these communities, which may be both adverse and beneficial. Indirect impacts to grassland and shrubland communities result from activities that alter the quality and health of these communities. For example, activities that result in soil compaction, erosion, changes in hydrology, and encroachment of INPS are considered indirect impacts. Beneficial impacts to grassland and shrubland communities include activities that minimize, reduce, or prevent the spread of INPS into these communities and vegetative treatments to improve these communities. For the purpose of this analysis, short-term impacts to grassland and shrubland communities comprise those activities that contribute to the decline in abundance or distribution of these communities within 5 years of when the activity occurs. Long-term impacts to grassland and shrubland communities are those that require more than 5 years to manifest on the surface.

4.4.2.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Almost all surface disturbance from oil and gas development could occur within grassland and shrubland communities.
- Based on the definition of surface-disturbing activity (mechanized actions), oil and gas development is identified as the primary source of surface disturbance in the planning area.
- Surface disturbances generally increase the potential for accelerated erosion.
- Surface disturbances substantially increase the likelihood of the introduction and spread of INPS in an area.
- Management toward DPC is assumed to exceed the requirements of managing toward DFC.
- The placement of supplements can affect the distribution of livestock grazing within grassland and shrubland communities.

- Grazing and browsing, whether by livestock or wildlife, is important for maintaining the health of grassland and shrubland communities. Improper grazing can decrease plant vigor and ground cover, lead to increased erosion, degrade soil nutrients and water retention, and impact rangeland health.
- Grazing practices can maintain, improve, or degrade rangeland health. Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming (BLM 1998b) are designed to maintain or improve rangeland health and are applied under all alternatives. Approximately 10 percent of the public land acreage in the planning area is evaluated annually for rangeland health.
- As rangelands are evaluated, guidelines are implemented to improve undesirable conditions regardless of allotment category (see Glossary). Over time, implementing guidelines is expected to continue to improve and maintain the health of these communities. Please refer to the Livestock Grazing section in this chapter for more detailed information.
- The BLM and grazing lessees strive to manage livestock grazing to maintain or improve rangeland health.
- The primary conduit for the initial establishment of the spread of INPS is through the road network.
- Fire plays an intricate role in these communities, particularly shrubland communities.
- Prescribed fire is a tool used to manage vegetative communities and can result in short-term negative impacts with long-term beneficial impacts to wildlife and wildlife habitats.

4.4.2.2 Analysis of Alternatives

Allowable uses and management actions that could impact grassland and shrubland communities include surface-disturbing activities, livestock grazing, wildlife use, OHV use, fire management, and proactive management actions. These allowable uses and management actions are expected to result in changes that directly or indirectly influence diversity, productivity, successional stage, nutrient cycling, and continuity of grassland and shrubland communities.

Impacts Common to All Alternatives

The types of impacts projected to occur to grassland and shrubland communities as a result of the various alternatives are similar; however, the extent and intensity of impacts is anticipated to vary by alternative. Therefore, impacts to grassland and shrubland communities from surface-disturbing activities, livestock grazing, wildlife use, OHV use, fire management, and proactive management actions are described under the individual alternatives.

Surface-disturbing activities occur under all alternatives. BMPs for surface-disturbing activities are applied under all alternatives. Under normal circumstances, standard mitigation guidelines are effective in minimizing impacts to resources; however, conditions such as steep slopes, highly erosive soils, or extreme environmental events may require more aggressive management actions to mitigate adverse impacts.

The use of certified weed-free seed mixes and, in some situations, the use of nonnative species reduces the establishment and spread of INPS. Under all alternatives, 6,016 acres in the planning area are closed to livestock grazing. This could reduce the spread of INPS in these areas; however, wildlife continues to use these areas and serve as vectors for spreading INPS.

Alternative A

Surface-disturbing Activities. Under Alternative A, surface-disturbing activities are evaluated on a case-by-case basis. Surface disturbance directly impacts plant communities through vegetation removal and mechanical damage to plants. Indirect impacts of surface disturbance on vegetation include soil compaction, erosion, changes in hydrology, and encroachment by INPS. These indirect impacts can limit recovery or rehabilitation of vegetative communities following disturbance. Conversely, vegetation treatments (e.g., mechanical methods, prescribed fire, prescribed grazing, or chemical treatment), while resulting in short-term disturbance, will result in long-term beneficial impacts to grassland and shrubland communities. Vegetation treatments can successfully achieve vegetative objectives to increase plant and seral stage diversity, control INPS, improve the quality and quantity of vegetation for wildlife and livestock, and create or maintain the desired mosaic.

Fire management also can benefit grasslands and shrublands. Prescribed fire is an important vegetation management tool used to achieve a desired vegetative condition, but it also carries some risk of INPS establishment. Prescribed fire can help meet specific management objectives, such as maintaining a range of seral stages within shrublands; however, prescribed burns generally are not possible in areas with oil and gas development or wildland-urban interface (WUI).

Under Alternative A, short-term and long-term disturbance from BLM actions are the third highest acreage of all alternatives, following alternatives D and E, respectively (see Appendix M). These acreage (21,087 acres for Alternative A and 22,080 acres for Alternative D) are within 5 percent of each other. Under Alternative A, the impacts to grassland and shrubland communities associated with surface-disturbing activities are expected to be primarily adverse. Short-term impacts occur in the 5 years following the disturbance and include damage to vegetation and spread of INPS. Long-term impacts occur beyond 5 years and primarily include loss of habitat due to development. Based on the case-by-case basis of reclamation actions under Alternative A and amount of long-term disturbance acreage projected, Alternative A is expected to have short and long-term adverse impacts to grassland and shrubland communities.

Livestock Grazing. Livestock grazing can have both beneficial and adverse impacts on health and productivity of vegetative communities. Over the last 50 years, rangeland conditions in the planning area have improved with the application of better grazing management practices. However, areas where rangeland health is most likely to be adversely impacted are areas where livestock congregate. These include areas containing water, shade, and (or) more palatable forage. Therefore, management is often geared toward improving the overall distribution of livestock within an allotment. This is accomplished through the implementation of BMPs, such as developing allotment management plans or coordinated resource management plans, changing grazing systems, and implementing range improvement projects (i.e., fencing, water development projects, salt and mineral licks). Kovalchik and Elmore (1992) describe the compatibility of livestock grazing using different grazing systems with willow-dominated plant associations similar to those found in some riparian areas of the planning area.

In addition to congregation areas, livestock movement transports seed and propagates of INPS, thereby expanding infestations of these species. Congregation areas, transport of INPS, and adverse impacts to vegetation from livestock and native ungulates historically have contributed to the challenge of managing rangeland health and productivity in the planning area.

Through proper grazing management, livestock grazing can benefit rangeland health by improving plant vigor, increasing vegetative cover, and reducing INPS infestations. This occurs by using hoof action to break up soil crust that restricts infiltration and inhibits seedling establishment, removing old growth and decadent vegetation that inhibits new growth, increasing cover and vigor of native vegetation, and

decreasing soil erosion. Healthier plant communities are more resistant to the spread of INPS and other undesirable plant species. One tool used to decrease the spread of INPS in an area is to have livestock graze an INPS species at a crucial point in its life-cycle. For example, goats can be used to graze thistle prior to seed set and cattle can be used to graze areas infested with cheatgrass in early spring, thereby reducing its vigor and making water and nutrients more available to native vegetation.

On the other hand, over-utilization over time by livestock or wildlife in grasslands and shrublands reduces abundance of certain native plants, allows less desirable forage species to increase, and allows INPS to enter and, in some cases, dominate communities. An indirect impact of over-grazing is a decrease in ground cover, resulting in an increase in runoff and soil erosion, which can impact the health of the entire plant community. These adverse impacts can be both short and long term.

Under Alternative A, monitoring and preventing of over-utilization over time is emphasized on higher priority allotments (Categories I and M). By emphasizing monitoring on higher priority allotments only undesirable conditions in lower priority allotments may not be identified and deterioration or improvement occurring in vegetative communities may not be realized in a timely manner. Alternative A utilizes stock driveways (SDWs) to the fullest extent possible. No holding period is required to flush livestock to reduce the risk of INPS spread under Alternative A. Short- and long-term adverse impacts are anticipated under Alternative A to grassland and shrubland communities based on the 10 percent annual evaluation of public land acreage, full use of SDWs, and no holding period for livestock.

OHV Use. Alternative A is the least restrictive to OHV use. Under this alternative, the majority of the planning area is limited to existing roads and trails. OHV use is limited by legal access to public lands and the availability of existing roads and trails. Off-road use is allowed without prior approval for activities defined under casual use regulations or for other necessary tasks as defined in the 1985 RMP. Current guidelines provide for off-road and off-trail travel up to 300 feet for recreational purposes. This 300-feet guidance is common to all alternatives. Areas that allow OHV activities, but are further restricted by limiting use to designated roads and trails, include the Red Wall, the Sandhills, along the North Platte River, and in SRMAs. These areas generally have sensitive soils, high visual qualities, or high visitor numbers. Alternative A requires the least amount of proactive management by the BLM and, therefore, has the most impacts to grassland and shrubland communities. Areas where damage from OHV use is most likely to occur include stream crossings, areas with highly erosive soils, steep slopes, and vegetative communities with plants susceptible to physical damage such as Wyoming big sagebrush.

OHV use on public lands can result in adverse short-term and long-term impacts to vegetation in grassland and shrubland communities. A one-time disturbance resulting from OHV use causes physical damage to vegetation by breaking stems and branches and may disturb the soil surface depending on soil conditions, slope, and ground cover. Usually, with a one time disturbance, plants and disturbed areas recover. However, with repeated use, new trails are established, resulting in long-term loss of vegetation, soil erosion, and introduction of INPS seeds into grassland and shrubland habitats.

Under Alternative A, OHV use in the Poison Spider OHV Park continues. The impact on vegetation in this area would be greater than other areas due to the intensity of use and is not reflective of OHV use across the planning area.

Fire Management. Wildland fire and prescribed fire have both adverse and beneficial impacts on grassland and shrubland communities. In the short term, fire results in the loss of habitat and can promote the spread of INPS, which can out-compete native plants. In the long term, because of the role fire historically played in these communities, fire can increase vegetative diversity across the landscape, rejuvenate decadent plants, and improve the overall health of these communities. In shrubland communities, the impacts resulting from fire usually are long term and depend on the scale and severity of

the disturbance. The potential for sagebrush shrublands to revert back to sagebrush depends on the acreage burned, the distance to seed sources, and the spread of INPS, such as cheatgrass, which can increase fire frequency. Limiting or protecting acreage from fire may in some cases lessen direct loss of grassland and shrubland communities and reduce the potential spread of INPS in the short term, but considering fire's historical role, the lack of fire may decrease the overall health of these communities.

Fire can have beneficial impacts in the form of enhancing age structure, restoring vigor, and restoring community types through regeneration. Fire-suppression activities can limit short- and long-term fire damage to vegetation, but can also cause mechanical and chemical damage to vegetation and increase the likelihood of INPS introduction and (or) spread into an area. Direct short- and long-term impacts to grassland and shrubland communities can occur from wildland fire and from fire-suppression tactics. Using full suppression tactics and (or) limited tactics can damage vegetation, a direct adverse impact, and potentially spread INPS, an indirect adverse impact. If INPS are already present in an area, they can spread regardless of the type of suppression used.

Under Alternative A, limitations using heavy equipment occur only in elk crucial winter range and areas containing wagon ruts of the Oregon and Bozeman trails; elsewhere, using heavy equipment is on a case-by-case basis. Fire suppression and rehabilitation and stabilization following a wildfire are on a case-by-case basis under Alternative A. No integrated management technique approach for fuels is implemented. Based on the approach to fire management, Alternative A is anticipated to have direct and indirect adverse impacts to grassland and shrubland communities.

Proactive Management Actions. Beneficial long-term impacts to grassland and shrubland health occurs under each alternative to varying degrees by managing a percentage of these communities toward desired future conditions (DFC). Managing toward DFC improves overall community health, improves plant vigor, reduces potential erosion, and improves forage for livestock and wildlife. Management actions to achieve DFC in grassland and shrubland communities are implemented on a case-by-case basis under Alternative A. This type of management could result in the smallest area of grassland and shrublands at DFC. Alternative A has the least beneficial long-term impacts of all the alternatives on improving grassland and shrubland communities because this management action is implemented on a case-by-case basis.

Alternative B

Surface-disturbing Activities. Under Alternative B, the projected short- and long-term surface disturbances from BLM actions are the lowest of all alternatives. Compared with Alternative A, the long-term surface disturbance under Alternative B (11,565 acres) is approximately 45-percent less. Alternative B implements the strictest reclamation requirements of all alternatives, requiring retreatment of reclaimed areas that do not have 50 or 80 percent of pre-disturbance vegetative cover in 3 or 5 years, respectively. In addition, all seed mixes must be certified weed-free under Alternative B, potentially reducing the spread of INPS.

Under Alternative B, the adverse impacts anticipated from surface-disturbing activities are expected to be similar in nature as described under Alternative A, but differ in intensity due to the number of acres disturbed and more stringent reclamation requirements. Based on the acreage of disturbance and the management actions implemented to reduce disturbance to grassland and shrubland communities, adverse impacts under Alternative B are expected to be less than Alternative A and all other alternatives.

Livestock Grazing. The same types of impacts described under Alternative A are expected to occur under Alternative B, but the intensity of the impacts differ. Alternative B places equal emphasis on all allotments for monitoring and prevention of improper grazing and downward trends. Placing emphasis

on monitoring all allotments allows the BLM to identify and respond to undesirable conditions in all allotments in a timely manner, as well as identifying the deterioration or improvement occurring in vegetative communities. Livestock grazing is managed to maintain protective cover of the vegetation and litter, thereby reducing soil compaction and erosion. Forage utilization is limited to 40 percent of the current year's production in order to leave standing residual vegetation that would eventually become litter, a beneficial long-term impact to grassland and shrubland communities. Limiting forage utilization may impact livestock operations by requiring herding, fencing, rotational grazing, or limiting season of use. Under Alternative B, a livestock flushing period of 72 hours may be required to reduce the spread of INPS. The annual evaluation of all allotments, limits to forage utilization by livestock, and the livestock flushing period, are anticipated to have more beneficial impacts than Alternative A and the least adverse impact of all alternatives on grassland and shrubland communities.

OHV Use. Under Alternative B, the same types of impacts described under Alternative A from OHV use are expected to occur; however, the extent of these impacts are expected to be less. Alternative B closes the largest area to OHV use (26,027 acres), has the smallest area (909,651 acres) designated as limited to existing roads and trails, and has the largest area (425,657 acres) designated as limited to designated roads and trails. Alternative B expands the Poison Spider OHV Park to 242 acres. Based on the acreage of each designation, Alternative B is expected to be the least adverse to grassland and shrubland communities of all the alternatives.

Fire Management. The same types of impacts described under Alternative A from fire management are expected to occur under Alternative B, but the intensity of the impacts differ. Under Alternative B, appropriate management response is used on all wildland fires, designating what type of suppression activities are appropriate in certain locations of the planning area. No heavy equipment is used in areas of cultural resource sensitivity, big game crucial winter range, greater sage-grouse leks, and areas of highly erosive soils, benefiting grassland and shrubland communities by limiting damage to vegetation and reducing the risk of INPS invasion. Rehabilitation and stabilization of suppression activities also benefit grassland and shrubland communities by reducing the risk of the spread of INPS and soil erosion. Alternative B manages fuels with an integrated management approach to protect high resource values. Based on the type of management and limitations on suppression activities, adverse, short- and long-term impacts under Alternative B occur, but they would be less than Alternative A.

Proactive Management Actions. Beneficial impacts described under Alternative A are anticipated to occur under Alternative B from proactive management actions, but the intensity differs. Alternative B manages for DPC in all sagebrush (630,183 acres) and mountain shrub communities (46,779 acres). Beneficial long-term impacts would be greater under Alternative B than under Alternative A and the greatest of all alternatives to grassland and shrubland communities.

Alternative C

Surface-disturbing Activities. The impacts under Alternative C are similar in nature to the impacts from surface-disturbing activities described under Alternative A, but differ in intensity. Under Alternative C, the projected short- and long-term surface disturbance from BLM actions is the second lowest of all alternatives. Compared with Alternative A, the long-term surface disturbance under Alternative C (20,358 acres) would be approximately 4-percent less. Alternative C requires retreatment of reclaimed areas that do not have 30 or 50 percent of pre-disturbance vegetative cover in 3 or 5 years, respectively. In addition nonnative species may be used on a case-by-case basis in seed mixes. The use of nonnative species change the plant community in reclaimed areas, but reduces the opportunity for the spread of INPS.

Under Alternative C, the adverse impacts anticipated from surface-disturbing activities are expected to similar in nature to Alternative A. However, based on the acreage of disturbance and the management actions implemented to reclaim disturbance to grassland and shrubland communities, adverse impacts under Alternative C are expected to be less than Alternative A.

Livestock Grazing. The impacts under Alternative C are similar in nature to the impacts from livestock grazing described under Alternative A, but would differ in intensity. Under Alternative C, the monitoring and prevention of improper grazing and downward trends are emphasized on category I and M allotments (see Glossary). Undesirable conditions or downward trends in rangeland conditions are not identified in lower priority allotments in a timely manner. In areas containing highly erosive soils, livestock grazing is managed to maintain protective cover of the vegetation. Forage utilization by livestock levels are established for areas with highly erosive soils to leave more residual vegetation and litter on the ground to increase ground coverage. Limits to forage utilization provide beneficial long-term impacts to grassland and shrubland communities by minimizing soil erosion and increasing nutrient recycling. Adverse impacts to livestock operations may occur based on these limitations and are discussed in more detail in the Livestock Grazing section. Under Alternative C, a livestock flushing period of 72 hours may be required in the Level I Weed Management Area, reducing the risk of INPS spread in these areas. Based on no requirement for evaluating a certain number of allotments annually, maintaining protective cover of vegetation on highly erosive soils only, and requiring flushing of livestock only in certain areas, Alternative C is expected to have short- and long-term adverse impacts to grassland and shrubland communities, although adverse impacts are less than Alternative A.

OHV Use. The impacts under Alternative C are similar in nature to the impacts from OHV use described under Alternative A; however, the extent of these impacts are expected to be less. Alternative C closes the second largest area (7,943 acres) to OHV use and designates 1,162,113 acres limited to existing roads and trails. Alternative C designates 191,236 acres as limited to designated roads and trails and expands the Poison Spider OHV Park to 285 acres. Adverse impacts under Alternative C from OHV use based on the designated acreage are less than under Alternative A.

Fire Management. The impacts under Alternative C are similar in nature to the impacts from fire management described under Alternative A, but differ in intensity. Management of wildland fires under Alternative C is similar to Alternative B, except there are no full suppression areas and rehabilitation and stabilization include the fire area, not just the damage from suppression activities, reducing damage to vegetation, erosion, and the risk of the spread of INPS. Based on these additional management techniques, adverse short- and long-term impacts under Alternative C are expected to be less than Alternative A.

Proactive Management Actions. The impacts under Alternative C are similar in nature to the impacts from proactive management actions described under Alternative A, but differ in intensity. Alternative C manages 50 percent (315,902 acres) of existing sagebrush and 50 percent (23,390 acres) of existing mountain shrub communities toward DPC. Alternative C has greater beneficial long-term impacts to these communities than Alternative A.

Alternative D

Surface-disturbing Activities. The impacts under Alternative D are similar in nature to the impacts from surface-disturbing activities described under Alternative A, but differ in intensity. Under Alternative D, the projected short- and long-term surface disturbances from BLM actions are the highest of all alternatives. Compared with Alternative A, the long-term surface disturbance under Alternative D (22,080 acres) would be approximately 4-percent greater. Alternative D requires complete reclamation

within 5 years of the disturbance, but does not require any retreatment of reclaimed areas after final reclamation is complete. Nonnative species may be used in reclamation activities on a case-by-case basis.

Under Alternative D, the adverse impacts anticipated from surface-disturbing activities are expected to be similar in nature to Alternative A. However, based on the acreage of disturbance and the management actions implemented to reduce disturbance to grassland and shrubland communities, adverse impacts under Alternative D are expected to be greater than under Alternative A and the highest of any alternative.

Livestock Grazing. The impacts under Alternative D are similar in nature to the impacts from livestock grazing described under Alternative A, but differ in intensity. Under Alternative D, the monitoring and preventing of improper grazing and downward trends are prioritized on the highest priority allotments. Alternative D places no restrictions on forage utilization, nor does it manage for maintaining protective vegetative cover on the allotments. In addition, no flushing period for livestock is required, increasing the risk of INPS spread. Based on the lack of forage utilization limitation, lack of flushing period, and the emphasis on preventing a downward trend on Category I allotments, Alternative D is anticipated to have short- and long-term adverse impacts to grassland and shrubland communities greater than those under Alternative A and the greatest of all alternatives.

OHV Use. Under Alternative D the same types of impacts described under Alternative A are expected to occur. Alternative D closes 2,661 acres to OHV use (similar to alternatives A and E) and expands the Poison Spider OHV Park to 285 acres, similar to alternatives C and E. Alternative D designates 1,292,630 acres as limited to existing roads and trails and 66,001 acres as limited to designated roads and trails, similar to, but more than, Alternative A. Based on the acreage in each designation, adverse impacts under Alternative D are expected to be similar to Alternative A.

Fire Management. The impacts under Alternative D are similar in nature to the impacts from fire management described under Alternative A, but differ in intensity. Alternative D allows full suppression activities across the planning area, potentially resulting in the greatest adverse impacts of all alternatives, including damage to vegetation, erosion, and INPS spread. Rehabilitation and stabilization is conducted on a case-by-case basis. Similar to alternatives B and C, fuels management would utilize an integrated management approach. Based on these management strategies, adverse short- and long-term impacts are similar to, but less than, Alternative A.

Proactive Management Actions. The impacts under Alternative D are similar in nature to the impacts from proactive management actions described under Alternative A, but would differ in intensity. Alternative D manages 25 percent (157,546 acres) of existing sagebrush and 25 percent (11,695 acres) of existing mountain shrub communities toward DPC resulting in greater beneficial long-term impacts to these communities than Alternative A.

Alternative E (Preferred Alternative)

Surface-disturbing Activities. The impacts under Alternative E are similar in nature to the impacts from surface-disturbing activities described under Alternative A, but differ in intensity. Under Alternative E, the projected long-term surface disturbance from BLM actions is the second highest of all alternatives. Compared with Alternative A, the long-term surface disturbance under Alternative E (21,672 acres) is approximately 2-percent higher. Alternative E requires retreatment of reclaimed areas that do not have 30 or 50 percent of pre-disturbance vegetative cover in 3 or 5 years, respectively, similar to Alternative C. In addition, all seed mixes must be certified weed-free under Alternative E, although nonnative species may be used on a case-by-case basis, similar to Alternative C.

Under Alternative E, the adverse impacts anticipated from surface-disturbing activities are expected to be similar in nature to Alternative A. Based on the acreage of disturbance and the management actions

implemented to reduce disturbance to grassland and shrubland communities, including reclamation activities, adverse impacts under Alternative E are expected to be less than under Alternative A.

Livestock Grazing. The impacts under Alternative E are similar in nature to the impacts from livestock grazing described under Alternative A, but differ in intensity. Under Alternative E, emphasis for monitoring and preventing improper grazing and downward trends is given to all grazing allotments. Alternative E establishes forage utilization levels for areas with significant acreage of highly erosive soils. Forage utilization levels leave more standing residual vegetation, which over time, increases the amount of litter on the ground and protects the soil from erosion. While livestock is managed to achieve forage utilization levels, it is recognized that wildlife also would be using these areas. Limits to forage utilization provide long-term beneficial impacts to grassland and shrubland communities by minimizing soil erosion and increasing nutrient recycling. Adverse impacts to livestock operations may occur based on these limitations and are discussed in more detail in the Livestock Grazing section. With proper grazing management, the health of grassland and shrubland communities can be maintained or improved. This can occur by breaking up soil crust that restricts infiltration and inhibits seedling establishment and by increasing cover and vigor of native vegetation. Increased cover and vigor of native vegetation can, in turn, minimize soil erosion. Livestock grazing can also be used to remove old growth and decadent vegetation that inhibits new growth. Under Alternative E, a livestock flushing period of 72 hours may be required in the Level I Weed Management Area, reducing the risk of INPS spread in these areas, similar to Alternative C. Based on no requirement for evaluating a certain number of allotments annually, maintaining protective cover of vegetation on highly erosive soils only, and requiring flushing of livestock only in certain areas, Alternative E is expected to have short- and long-term beneficial and adverse impacts to grassland and shrubland communities. The adverse impacts are anticipated to be less and the beneficial impacts are expected to be greater than those under Alternative A.

OHV Use. The impacts under Alternative E are similar in nature to the impacts from OHV use described under Alternative A. The extent of these impacts is expected to be less. Alternative E closes the second smallest area (2,224 acres) to OHV use and designates 1,162,244 acres limited to existing roads and trails, which is similar to Alternative C. The area limited to designated roads and trails is 196,824 acres, similar to Alternative C. Alternative E expands the Poison Spider OHV Park to 285 acres. Adverse impacts to grassland and shrubland communities under Alternative E are expected to be less than Alternative A based on the acreage in each designation.

Fire Management. The impacts under Alternative E are similar in nature to the impacts from fire management described under Alternative A, but differ in intensity. Under Alternative E, appropriate management response is used on all wildland fires, designating what types of suppression activities are appropriate in certain locations of the planning area. No heavy equipment is used in areas of cultural resource sensitivity, big game crucial winter range, greater sage-grouse leks, and areas of highly erosive soils, benefiting grassland and shrubland communities by limiting damage to vegetation and reducing the risk of INPS spread, similar to Alternative B. Rehabilitation and stabilization are conducted on a case-by-case basis, similar to Alternative D. Similar to alternatives B, C, and D, Alternative E utilizes an integrated management technique approach to reduce fuels. Based on these management strategies, long-term adverse impacts to grassland and shrubland communities under Alternative E are anticipated to be less than under Alternative A.

Proactive Management Actions. The impacts under Alternative E are similar in nature to the impacts from proactive management actions described under Alternative A, but differ in intensity. Alternative E manages toward DPC in all sagebrush (630,183 acres) and mountain shrub communities (46,779 acres), similar to Alternative B. Beneficial long-term impacts to grassland and shrubland communities are greater under Alternative E than under Alternative A, and, along with Alternative B, the greatest of all alternatives.

4.4.2.3 Conclusion

The impacts from surface-disturbing activities on grassland and shrubland communities are expected to increase as the acreage disturbed increases. Therefore, the alternatives with higher acreage disturbed result in a greater adverse impact to these communities. The alternatives with lower acreage disturbed result in lesser adverse impacts, when compared to the other alternatives. Meaningful differences in long-term disturbance acreage; reclamation requirements for surface disturbance; management of livestock including forage utilization, grazing allotment evaluation, and flushing periods; OHV use and designations; fire suppression tactics and rehabilitation; acreage available for wind-energy development; and managing for DFC or DPC in shrubland communities form the basis for the following conclusion. Impacts to grassland and shrubland communities could be the least adverse under Alternative B and the most adverse under Alternative D. Potential adverse impacts to grassland and shrubland communities under alternatives C and E are similar and are expected to be less than Alternative A, but more than Alternative B.

4.4.3 Vegetation – Riparian and Wetland Communities

An impact to riparian and wetland areas impacts the physical, chemical, or biological components of the ecosystem. Actions that contribute to the decline in abundance, distribution, or functionality of riparian and wetland communities are considered adverse impacts. Conversely, beneficial impacts to riparian and wetland communities are activities that protect or restore these habitat types in the planning area.

Direct impacts to riparian and wetland communities result from disturbing vegetation or ground surface occurring in these communities. Indirect impacts to riparian and wetland communities result from actions within a watershed that cause a change in riparian and wetland functionality (e.g., increased rates of sediment loading or changes in hydrology), a change in water chemistry, and spread of INPS. For the purpose of this analysis, short-term impacts to riparian and wetland communities include actions contributing to the decline in abundance or distribution of these communities within 5 years of when the activity occurs. Long-term impacts to riparian and wetland communities are those requiring more than 5 years to manifest on the ground.

4.4.3.1 Methods and Assumptions

Evaluating potential impacts to riparian and wetland areas caused by changes in functionality or INPS establishment focuses on resource management actions that (1) cause surface disturbances or limit the impacts of surface disturbances, and (2) are substantially different among the proposed alternatives. Estimates of projected surface disturbances are used as the primary metric for determining the relative level of potential indirect impact to riparian and wetland areas.

Methods and assumptions used in this impact analysis include the following:

- Surface disturbances generally increase the potential for accelerated sediment loading to streams.
- Surface disturbances generally increase surface runoff to streams due to an increase in impervious surface, changes in water routing, and loss of vegetation.
- Surface disturbance, transportation networks, ungulate use, and recreation increase the likelihood of INPS introduction and spread in an area.
- The greater the amount of surface disturbance in a watershed, the greater the probability that excess surface runoff and sediment will enter the stream and contribute to the loss of riparian and wetland functionality.
- Placing salt and mineral supplements outside of riparian and wetland communities is one tool that can reduce wildlife and livestock use of riparian and wetland areas.

- Surface runoff to streams generally increases as livestock stocking rates increase. This is not a linear relationship. For example, low stocking rates typically have no measurable impact on surface runoff, moderate stocking rates typically have a negligible impact on surface runoff, high stocking rates have a measurable impact on surface runoff, and consecutive years of high stocking rates have the highest potential for increasing surface runoff to streams.
- Livestock and wildlife use is typically disproportionately higher in riparian and wetland communities than in upland communities. Improper grazing can adversely impact these communities throughout the year, but generally has greater impacts in the spring and early summer, when soils are wet and, therefore, more vulnerable to compaction and streambanks are more vulnerable to sloughing. Livestock, especially cattle, tend to congregate in these communities during the hot season (mid to late summer). While stocking rates for an allotment or pasture may be low to moderate, the utilization levels in riparian and wetland areas can be high.
- Riparian areas are evaluated during application of the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998b).
- Grazing practices can maintain, improve or degrade rangeland health. Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming (BLM 1998b) are designed to maintain or improve rangeland health. Approximately 10 percent of the public land in the planning area is evaluated for rangeland health annually.
- Livestock stocking rates in grazing allotments generally remain unchanged.
- Wildlife can adversely impact riparian and wetland areas, depending on how many, what type, and when the use occurs.
- Riparian and wetland areas possess the ability to recharge and rebound faster than other vegetative areas in the planning area.
- All riparian and wetland areas are evaluated per the Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming (BLM 1998b) and managed toward PFC. Management toward DPC is assumed to exceed the requirements of managing toward PFC.

4.4.3.2 Analysis of Alternatives

Allowable uses and management actions that could impact riparian and wetland communities include surface-disturbing activities, livestock grazing, and proactive management actions. Impacts to soil and water, which may impact riparian and wetland communities, are discussed in the Soil and Water sections earlier in this chapter.

Impacts Common to All Alternatives

The types of impacts projected to occur to riparian and wetland communities as a result of the various alternatives are similar. However, the intensity of impacts is anticipated to vary by alternative, as described under the individual alternatives.

Implementation of any of the alternatives may cause direct and (or) indirect impacts; however, no quantification of direct impacts to riparian and wetland areas exist for any of the alternatives. However, because the riparian and wetland areas are so limited and because they are often the most productive lands, they are disproportionately impacted by humans, livestock, and wildlife compared with the same

types or extent of actions in upland areas. Direct impacts to riparian and wetland areas generally are avoided and minimized whenever possible under all alternatives. In general, impacts from projects or uses that involve riparian areas are minimized through applications of BMPs.

Changes in water chemistry also can affect riparian and wetland areas primarily through changes in plant specie composition, which could impact utilization of the area by wildlife and livestock. Indirect impacts caused by changes in water chemistry historically have not been a major factor in the planning area and are not expected to be in the future.

Usually, the impacts caused by wildlife are less extensive than those caused by livestock, particularly cattle. Elk, deer, and pronghorn are attracted to and often congregate in these areas; however, due to their smaller size and foraging habits, they normally do not cause the amount of disturbance that cattle do. In localized areas, elk have substantially impacted riparian habitats through trampling, wallowing, and grazing. Because of their ability to rove across large areas and because generally they are not confined by fences, big game animals can disperse INPS seed over large areas and into other riparian and wetland habitats. Beaver can dramatically change the nature of a stream and the riparian and wetland areas associated with it. In some cases, the changes to the riparian and wetland areas created by beaver activity are beneficial; in others, the overall impact is adverse (i.e., denudation of willows).

The management of special status species generally involves restricting activities in the vicinity of special status plants or wildlife either year-round or during specific times of the year. As a result, riparian and wetland areas occurring in the vicinity of buffer zones of a special status species can benefit from the lower level of use by the public. Under all alternatives, no water development or salt, mineral, or forage supplements are allowed in areas inhabited by special status plant species or other sensitive areas. This restriction will prevent trampling of plants by livestock. The size of the buffers varies by alternative. An exception to this is the bald eagle, which generally nests in mature cottonwood trees, and that have a 1-mile seasonal buffer under all alternatives.

The use of certified weed-free seed mixes and, in some situations, the use of nonnative species can be used to reduce the amount of bare ground where INPS could spread. In accordance with BLM policy (Manual 1745), nonnative species cannot be used when they diminish biodiversity. Applying rangeland health standards and developing guidelines to maintain or improve riparian and wetland communities is a proactive action applying to all alternatives. The BLM would work with grazing lessees to manage livestock to accomplish this.

Alternative A

Surface-disturbing Activities. In the planning area, the following types of impacts may occur in riparian and wetland communities due to surface-disturbing activities. These types of impacts may occur under all alternatives; however, the intensity of the impacts varies by alternative.

Sediment and water are the two components of streamflow. Sediment inputs into a stream occur naturally due to natural processes of erosion. Streams and the adjacent riparian and wetland areas evolve over time in response to the amount of water and sediment they carry and (or) receive. A stream system generally is considered stable if the stream is in dynamic equilibrium with its water and sediment inputs. A stream may become unstable if the rate of water or sediment inputs changes, such as with an accelerated rate of sedimentation or an increase in water quantity.

Accelerated erosion from uplands and bank erosion increase sediment loading to streams. Typical causes for increased sediment loading into a stream are flash floods, changes from a relatively undisturbed condition to a more intensive land use in a watershed, surface disturbances in a watershed, improper livestock grazing practices, and wildlife use that alters vegetative cover. Higher sediment loads entering a

stream can dramatically alter its form and, consequently, the functionality of the riparian and wetland communities adjacent to it. The impact of increased sediment loading depends on the stream's ability to pass the sediment through the system and largely depends on the size (i.e., discharge volume) of the stream and the channel slope gradient. In segments of a stream that have a lower gradient, deposition occurs and the stream channel aggrades (builds), possibly becoming braided and shallow. In some instances, the aggradations of the streambed at one location can cause the stream to down cut or degrade (become more incised) in upstream reaches as the stream seeks to restore its equilibrium. The additional material eroded from the upstream channel is transported down to the depositional area and the cycle continues. In such cases, the functionality of the riparian and wetland areas in both the aggraded stream reach and the incised stream reach change.

Increases or reductions in water quantity also can impact riparian and wetland functionality. Prolonged decreases in water quantity (e.g., during times of drought, due to diversions for irrigation, or due to groundwater depletions) can cause a shift in plant species composition in riparian and wetland areas and increase the chances for INPS spread. Typically, plant species that prefer drier conditions do not bind the soil as well as riparian and wetland vegetation and, thereby, can cause a decrease in streambank stability. Drier conditions also can lead to a decrease in productivity and impact the ability of the riparian area or wetland to support wildlife species.

Increases in surface runoff can have a beneficial impact on riparian and wetland areas because more water may be available for plant growth, thereby increasing plant productivity and abundance. However, increases in surface runoff volumes also can result in an increase in channel incision. This could disconnect the stream from its floodplain (i.e., gully formation), rendering the floodplain nonfunctional. If the stream becomes incised enough, the conditions within associated riparian and wetland areas can become drier and a shift in plant species composition can occur, contributing to bank destabilization and, consequently, to increases in sediment loading.

Changes in surface runoff can occur due to natural or human causes. Natural causes include climatic cycles (e.g., periods of drought or high precipitation) and catastrophic events (e.g., flash floods, fires, earthquakes, and landslides). Human impacts to surface runoff occur primarily due to land use changes. One of the most prevalent increases in surface runoff caused by human activity is an increase in impervious cover (e.g., roads, parking lots, and rooftops). Roads are not only impervious, they also route water. For this reason, it is undesirable to have a road close to a stream or crossings where runoff from the road is more likely to reach the stream. Improper livestock grazing and sometimes wildlife use can also increase runoff within a watershed due to soil compaction and loss of vegetative cover, with the amount of bare ground being the primary factor (Lusby 1970). Proper livestock grazing can increase vegetative cover and reduce peak runoff quantities to streams and levels of erosion.

Water production from CBNG wells and traditional oil and gas development represents a new water source within a watershed that augments existing water flows. As discussed previously, this can be both beneficial and detrimental to a water course. Both wildland fires and prescribed burns also can increase runoff and sediment to streams and other water bodies in the short term. In fact, a rainstorm following a fire can overwhelm downstream water bodies by contributing excessive amounts of sediment, large woody debris, and water to the system in a short period of time. Vegetation response after a fire can have beneficial impacts on a watershed by helping to recharge water tables and increasing the amount of herbaceous cover, thereby improving livestock distribution and lessening erosion.

INPS are particularly undesirable in riparian and wetland areas because they do not have the same high level of soil-binding properties that many native riparian and wetland species (e.g., willows and sedges) have. The proximity of surface disturbances to riparian and wetland areas is one of the primary ways in which INPS can spread in these areas. INPS are typically spread through road networks, water courses

and wind, and most easily become established in disturbed areas. Livestock and wildlife also can disperse INPS seed. The interrelationships of livestock grazing, INPS control, and rangeland health are discussed in the Livestock Grazing section.

Salt cedar is a shrubby INPS and a concern in some riparian and wetland areas because it transpires large amounts of water, resulting in salinization of soil around the plant. This species is a phreatophyte, which is a deep-rooted plant that obtains water from the water table. As a result, salt cedar could exclude native riparian shrubs and herbaceous plants, thereby radically altering wildlife habitats and impacting other functions. Salt cedar is somewhat different from other INPS species in that surface disturbances outside of the riparian zone do not increase its ability to invade riparian and wetland areas. In other words, salt cedar is invasive even in areas of low surface disturbance.

Under Alternative A, surface-disturbing activities are evaluated on a case-by-case basis on BLM-administered land; no requirement exists to apply BMPs to all surface-disturbing activities in the planning area. Surface-disturbing activities can occur on highly erosive soils under Alternative A. While most surface-disturbing activities will not occur in riparian and wetland areas, these areas may be indirectly impacted due to erosion and an increase of sediment going into streams. Complete reclamation activities are implemented on a case-by-case basis. These management actions could result in indirect, adverse impacts to riparian and wetland communities, including the spread of INPS.

Under Alternative A, short-term and long-term disturbance from BLM actions is the third highest of all alternatives, following alternatives D and E, respectively (see Appendix M). These long-term disturbance acres (21,087 acres for Alternative A and 22,080 acres for Alternative D) are within 5 percent of each other. Under Alternative A, the impacts to riparian and wetland communities associated with surface-disturbing activities are mostly indirect impacts and expected to be primarily adverse. Short-term impacts occur in the 5 years following the disturbance and include increased sediment into streams and the spread of INPS. Long-term impacts occur beyond 5 years and primarily include loss of habitat due to development. This is based on the case-by-case management of reclamation under Alternative A and the long-term disturbance acreage projected.

Livestock Grazing. With proper grazing management and implementation of rangeland improvement projects, the health of riparian and wetland areas can be sustained or improved. All alternatives involve management of livestock grazing in riparian areas. The degree and extent of grazing-related impacts to riparian and wetland areas over the long-term are expected to continue to improve. On the other hand, improper livestock grazing practices decrease the functionality of riparian and wetland areas through soil compaction and hummocking, physical removal and destruction of vegetation, and trampling of streambanks causing bank failure. Clary and Kinney (2000) indicate that the damage to riparian habitats as a result of bank alterations is greater than or equal to the damage caused by changes in vegetation biomass. Livestock grazing in riparian areas can prevent regeneration of woody and herbaceous riparian vegetation necessary to stabilize streambanks. Kovalchik and Elmore (1992) state that improper livestock grazing adversely impacts the stability of some riparian areas dominated by willow.

Placement of salt and mineral supplements is considered on a case-by-case basis under Alternative A with respect to locations of water sources, special status plants, and riparian and wetland communities. Under all alternatives, 6,016 acres in the planning area are closed to grazing. By emphasizing monitoring on only higher-priority allotments (Categories I and M, see Glossary) undesirable conditions in lower-priority allotments may not be identified and deterioration or improvement that is occurring in vegetative communities may not be realized in a timely manner. No holding period is required to flush livestock to reduce the risk of INPS spread under Alternative A.

Proactive Management Actions. Management actions that strive to improve streams and conserve riparian and wetland areas generally result in long-term, beneficial impacts to riparian and wetland communities. Under Alternative A, 350 miles of lotic and adjacent riparian habitat and 10,000 acres of lentic habitat would be managed toward PFC, benefiting riparian and wetland communities. No management action under Alternative A emphasizes eradication of salt cedar. Managing riparian and wetland areas toward PFC would result in long-term, beneficial impacts to these communities under Alternative A.

Alternative B

Surface-disturbing Activities. The types of impacts to riparian and wetland communities under Alternative B for surface-disturbing activities are expected to be the same as described under Alternative A, except in intensity. Under Alternative B, the projected short and long-term surface disturbance from BLM actions are the lowest of all alternatives. Compared with Alternative A, the long-term surface disturbance under Alternative B (11,565 acres) is approximately 45-percent less. Alternative B implements the strictest reclamation requirements of all alternatives, requiring retreatment of reclaimed areas that do not have 50 or 80 percent of pre-disturbance vegetative cover after 3 or 5 years, respectively. Under Alternative B, the adverse impacts anticipated from surface-disturbing activities are expected to similar in nature, but less in intensity compared to Alternative A. Surface-disturbing activities under Alternative B have the least adverse impact to riparian and wetland communities of all alternatives.

Livestock Grazing. The types of impacts to riparian and wetland communities under Alternative B for livestock grazing are expected to be the same as described under Alternative A, except in intensity. Salt and mineral supplements are placed at least ½ mile away from all water sources and riparian and wetland areas. Exceptions to this management action are made on a case-by-case basis based on NEPA analysis. Placing supplements away from riparian and wetland communities will attract livestock away from these areas, improve livestock distribution in an allotment, and reduce impacts to these communities. Alternative B places equal emphasis on all allotments for monitoring and preventing improper grazing and downward trends, which would allow the BLM to identify and respond to undesirable conditions on an allotment in a timely manner. Livestock grazing is managed to maintain protective cover of the vegetation and litter and reduce soil compaction and erosion. Forage utilization by livestock is limited to 40 percent of the current year's production to leave standing residual vegetation that eventually becomes litter, a beneficial, long-term impact. Limiting forage utilization may impact livestock operations by requiring herding, fencing, rotational grazing, or limiting season of use. Under Alternative B, a livestock flushing period of 72 hours may be required to reduce the spread of INPS. Based on the placement of supplements away from riparian and wetland areas, the annual evaluation of all allotments, limitation of forage utilization by livestock, and the livestock flushing period, Alternative B is anticipated to have less adverse impact than Alternative A, and the least adverse impact of all alternatives on riparian and wetland communities.

Proactive Management Actions. Under Alternative B, 350 miles of lotic and adjacent riparian habitats and 10,000 acres of lentic habitats are managed for DPC. In addition, Alternative B emphasizes improving floodplain connectivity and function on 350 stream miles and restores 108 miles of incised streams and 90 acres of lentic habitats. Alternative B eradicates 1,700 acres of salt cedar. All these management actions could improve riparian and wetland functionality and result in direct long-term beneficial impacts to these areas. Alternative B also implements more protective measures than the other alternatives for riparian, wetland, and surface water areas from fire-suppression activities and has the least adverse impact due to these activities of all the alternatives. The beneficial impacts under Alternative B are greater than under Alternative A and the greatest of all alternatives.

Alternative C

Surface-disturbing Activities. The types of impacts to riparian and wetland communities under Alternative C for surface-disturbing activities are expected to be the same as described under Alternative A, except in intensity. Under Alternative C, the projected short- and long-term surface disturbance from BLM actions is the second lowest of all alternatives. Compared with Alternative A, the long-term surface disturbance under Alternative C (20,358 acres) is approximately 4-percent less. Alternative C requires retreatment of reclaimed areas that do not have 30 or 50 percent of pre-disturbance vegetative cover in 3 or 5 years, respectively. In addition, nonnative species may be used on a case-by-case basis to reclaim disturbed areas. Since some nonnative species are more easily established on some soils than native species, their use could reduce soil erosion and the amount of sediment going into riparian and wetland areas. Their use also could reduce the spread of INPS. Under Alternative C, the adverse impacts anticipated from surface-disturbing activities are expected to similar in nature to those in Alternative A. Based on the acreage of disturbance and the management actions implemented to reduce disturbance to riparian and wetland communities, adverse impacts under Alternative C are expected to be less than under Alternative A.

Livestock Grazing. The types of impacts to riparian and wetland communities under Alternative C for livestock grazing are expected to be the same as described under Alternative A, except in intensity. Salt and mineral supplements are placed at least ¼ mile away from all water sources and riparian and wetland areas. Exceptions to this management action are made on a case-by-case basis based on NEPA analysis. Under Alternative C, the monitoring and preventing of improper grazing on downward trends are emphasized on I and M Category allotments (see Glossary). Undesirable conditions or downward trends in rangeland conditions are not identified in lower-priority allotments in a timely manner. In areas containing highly erosive soils, livestock grazing is managed to maintain protective cover of the vegetation. Forage utilization by livestock levels is established for areas with highly erosive soils to leave more residual vegetation and litter on the ground, thereby increasing ground cover. Limits to forage utilization provide beneficial long-term impacts to riparian and wetland communities by minimizing soil erosion and increasing nutrient recycling. Adverse impacts to livestock operations may occur based on these limitations and are discussed in more detail in the Land Resources section under Livestock Grazing. Under Alternative C, a livestock flushing period of 72 hours may be required in Level I Weed Management Areas, reducing the risk of INPS spreading in these areas. Alternative C, based on the placement of supplements requirement, no requirement for evaluating a certain number of allotments annually, maintaining protective cover of vegetation on highly erosive soils only, and requiring flushing of livestock only in particular areas, is expected to have less short- and long-term adverse impacts to riparian and wetland communities than Alternative A.

Proactive Management Actions. Under Alternative C, 175 miles of lotic and adjacent riparian habitats and 5,000 acres of lentic habitats are managed for DPC. In addition, 108 miles of floodplain connectivity and function will be improved. Alternative C restores 75 miles of incised streams and 47 acres of lentic habitats. Alternative C eradicates 1,275 acres of salt cedar. These management actions would improve riparian and wetland areas and functionality and result in greater beneficial impacts under Alternative C than under Alternative A.

Alternative D

Surface-disturbing Activities. The types of impacts to riparian and wetland communities under Alternative D for surface-disturbing activities are expected to be the same as described under Alternative A, except in intensity. Under Alternative D, the projected short- and long-term surface disturbances from BLM actions are the highest of all alternatives. Compared with Alternative A, the long-term surface disturbance under Alternative D (22,080 acres) is approximately 4-percent greater. Alternative D requires complete reclamation within 5 years of disturbance, but does not require any retreatment of reclaimed

areas after final reclamation is complete. Nonnative species could be used in reclamation activities on a case-by-case basis. Under Alternative D, the adverse impacts anticipated from surface-disturbing activities are expected to similar in nature to Alternative A. Based on the acreage of disturbance and the management actions implemented to reduce disturbance to riparian and wetland communities, adverse impacts under Alternative D are expected to be greater than under Alternative A and the highest of any alternative.

Livestock Grazing. The types of impacts to riparian and wetland communities under Alternative D for livestock grazing are expected to be the same as described under Alternative A, except in intensity. Salt and mineral supplements are placed at least ¼ mile away from all water sources and riparian and wetland areas, similar to Alternative C. Exceptions to this management action are made on a case-by-case basis according to NEPA analysis. Under Alternative D, the monitoring and preventing of improper grazing and downward trends emphasize the highest priority allotments. Alternative D places no restrictions on forage utilization, nor does it manage for maintaining protective vegetative cover on the allotments. In addition, no flushing period for livestock would be required, increasing the risk of INPS spreading. Based on the placement of supplements requirement, lack of forage utilization limitation, lack of a flushing period, and the emphasis on preventing a downward trend on Category I allotments (see Glossary), Alternative D is anticipated to have short- and long-term adverse impacts greater than those under Alternative A and the greatest of all alternatives.

Proactive Management Actions. Under Alternative D, 88 miles of lotic and adjacent riparian habitats and 2,500 acres of lentic habitats are managed for DPC. In addition, 75 miles of floodplain connectivity and function are improved. Alternative D restores 33 miles of incised streams and 43 acres of lentic habitats. Alternative D eradicates 850 acres of salt cedar. These management actions would improve riparian and wetland areas and functionality and result in greater beneficial impacts under Alternative D than under Alternative A.

Alternative E (Preferred Alternative)

Surface-disturbing Activities. The types of impacts to riparian and wetland communities under Alternative E for surface-disturbing activities are expected to be the same as described under Alternative A, except in intensity. Under Alternative E, the projected long-term surface disturbance from BLM actions is the second highest of all alternatives. Compared with Alternative A, the long-term surface disturbance under Alternative E (21,672 acres) is approximately 3-percent higher. Alternative E requires retreatment of reclaimed areas that do not have 30 or 50 percent of pre-disturbance vegetative cover in 3 or 5 years, respectively, similar to Alternative C. In addition, all seed mixes must be certified weed-free under Alternative E, although nonnative species may be used on a case-by-case basis, similar to Alternative C. Under Alternative E, the adverse impacts anticipated from surface-disturbing activities are expected to be similar in nature to Alternative A. Based on the acreage of disturbance and the management actions implemented to reduce disturbance to riparian and wetland communities, including reclamation activities, adverse impacts under Alternative E are expected to be less than under Alternative A.

Livestock Grazing. The types of impacts to riparian and wetland communities under Alternative E for livestock grazing are expected to be the same as described under Alternative A, except in intensity. Under Alternative E, salt and mineral supplements are placed at least ¼ mile away from all water sources and riparian and wetland areas, similar to Alternative C. Exceptions to this management action are made on a case-by-case basis according to NEPA analysis. Under Alternative E, an emphasis on monitoring and preventing downward trends is given to all grazing allotments. Alternative E establishes forage utilization levels for areas with substantial acreage of highly erosive soils. Forage utilization levels leave more standing residual vegetation that, over time, increase the amount of litter on the ground and protect

the soil from erosion. While livestock is managed to achieve forage utilization levels, it is recognized that wildlife are also using these areas. Limits to forage utilization on upland vegetative communities provide an indirect long-term beneficial impact to riparian and wetland communities by minimizing soil erosion and increasing nutrient recycling. Adverse impacts to livestock operations could occur based on these limitations and are discussed in more detail in the Land Resources section under Livestock Grazing. With proper grazing management, the health of vegetative communities within a watershed can be maintained or improved by breaking up soil crust that restricts infiltration and inhibits seedling establishment and by increasing cover and vigor of native vegetation. Increased cover and vigor of native vegetation can, in turn, minimize soil erosion. Under Alternative E, a livestock flushing period of 72 hours may be required in Level I Weed Management Areas, reducing the risk of INPS spread in these areas, similar to Alternative C. Alternative E, based on the ¼-mile minimum distance requirement for placing supplements, maintaining protective cover of vegetation on highly erosive soils, and requiring flushing of livestock only in particular areas, is expected to have short- and long-term adverse impacts less than those under Alternative A. For the same reasons, Alternative E is expected to have short- and long-term beneficial impacts that are greater than those under Alternative A.

Proactive Management Actions. Under Alternative E, 350 miles of lotic and adjacent riparian habitats and 10,000 acres of lentic habitats are managed for PFC and identified DPC. In addition, 75 miles of floodplain connectivity and function are improved. Alternative C restores 33 miles of incised streams and 43 acres of lentic habitat. Alternative E would develop a plan to eradicate salt cedar. These management actions would improve riparian and wetland areas and functionality and result in greater beneficial impacts under Alternative E than under Alternative A.

4.4.3.3 Conclusion

Meaningful differences in long-term disturbance acreage; reclamation requirements for surface disturbance; management of livestock, including placement of supplements, forage utilization, grazing allotment evaluation, and flushing periods; acreage/mileage of habitat managed for PFC or DPC; and acreage/mileage of stream and lentic habitat restoration form the following conclusion. Impacts to riparian and wetland communities are anticipated to be the least adverse under Alternative B and the most adverse under Alternative D. Potential adverse impacts to riparian and wetland communities from alternatives C and E are expected to be similar to, but less than Alternative A.

4.4.4 Vegetation – Invasive, Nonnative Plant Species and Pest Control

Actions that could occur through implementing each alternative could be impacted by the spread of INPS. This section describes the impacts of each alternative according to INPS in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as being beneficial or adverse.

The presence of INPS in the planning area is considered an adverse impact. Actions that contribute to the introduction of INPS, the spread of existing INPS populations, or that avoid, reduce, or prohibit INPS control activities in the planning area also are considered adverse impacts.

The direct INPS impacts typically result from actions that disturb the soil or that otherwise create habitats (i.e., seedbed) for the establishment of INPS. Indirect impacts result from activities that avoid, reduce, or prohibit INPS control activities in the planning area. The transport (by wildlife, livestock, vehicles, wind, or water) of INPS seed or other plant parts to other locations, thereby expanding the distribution or increasing the rate of spread of INPS, is also considered an indirect impact.

4.4.4.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- INPS occur in greatest density in areas of past or current surface disturbance. Areas disturbed in the past and reclaimed may contain populations of INPS, but the abundance and distribution of these populations do not vary by alternative.
- Though there are exceptions, most INPS are less likely to invade relatively undisturbed and healthy natural vegetative communities.
- Roadways, trails, ROWs, and corridors are major routes of spreading INPS through the transport on motor vehicles and OHVs. INPS can also be spread through water courses, wind, and by wildlife and livestock movement.
- The total amount of new surface disturbance associated with an alternative is a good index of potential impact to INPS. The larger the acreage of surface disturbance, the greater the adverse impact by INPS.
- Success of reclamation measures prescribed as a condition of development is unknown and could underestimate the potential impact from INPS, but is not expected to vary by alternative.
- Enforcement of restrictions related to recreation and OHV and dispersed travel can be assumed only if adequate funding and personnel are available to do the job**.**
- Seeds from some INPS can remain dormant and viable in the soil for periods that exceed the 5-year division between short- and long-term impacts. Therefore, favorable site conditions may serve to reintroduce INPS to reclaimed sites without additional surface disturbance.
- The area evaluated for potential impacts includes the planning area and Natrona, Converse, Platte, and Goshen county weed control districts.
- The total acreage of long-term disturbance (Appendix M) includes facilities that cannot be reclaimed and that, in most cases, will not provide long-term habitats for INPS. For example, well pads, communication sites, powerlines, roads, wind energy facilities, and other infrastructure will replace existing native vegetation with pervious or impervious surfaces for a period exceeding 5 years.

4.4.4.2 Analysis of Alternatives

Allowable uses and management actions that could be impacted by INPS include all surface-disturbing activities, concentrated livestock and native ungulate grazing, fire management, recreation, OHV and dispersed travel, and proactive management actions.

As INPS are affected by the alternatives, INPS can, in turn, impact other resources. Impacts of INPS on other resources are described in the Fire Management and Ecology section and in other biological resources sections. Spread of INPS also can fragment landscapes, providing habitats for INPS invasion. Fragmented landscapes contain fewer intact ecosystems (Noss 1987). Refer to Map 22 for INPS.

Impacts Common to All Alternatives

The impacts of Pest Control are common to all alternatives. The BLM will coordinate with individuals, groups, and other agencies to control pests as needed.

The types of impacts projected to occur as a result of the various alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative. Therefore, impacts resulting from surface-

disturbing activities, concentrated livestock and native ungulate grazing, OHV use, fire management, recreation and dispersed travel, and proactive management actions are described under individual alternatives.

Alternative A

Surface-disturbing Activities. Surface-disturbing activities on BLM-administered land under Alternative A are evaluated on a case-by-case basis. As a result, there may be minimal restrictions on surface-disturbing activities, occupancy, and prescribed fire on highly erosive soils under this alternative. In addition, except for the South Bighorns, surface disturbance and occupancy are allowed on slopes greater than 25 percent with permission of the BLM authorized officer.

Under Alternative A, the projected short- and long-term disturbance, prior to and following reclamation, result in the third highest disturbance acreage following alternatives D and E, respectively (see Appendix M). The impacts from surface-disturbing activities under Alternative A are anticipated to be commensurate with the intensity of RFAs shown in Appendix M. Moreover, the impacts from surface disturbance projected for Alternative A are anticipated to be primarily adverse. Both short-and long-term adverse impacts are anticipated from surface disturbance. Short-term impacts will occur during the 5 years following disturbance while the soil is bare of vegetation and reclamation activities strive to stabilize the soil and revegetate the area. Relative to reclamation, Alternative A does not require the use of certified weed-free seed when reclaiming disturbed areas. Long-term impacts will occur beyond 5 years due to reclamation efforts that are not 100 percent effective in preventing INPS establishment. For example, the seeds and other plant parts of INPS that establish along roads are anticipated to be spread by cars and wind to other sites within the planning area throughout the life of the plan. In addition, some INPS seeds have the ability to lie dormant in the soil beyond the 5-year reclamation period. For the reasons stated, most adverse impacts are anticipated to be long-term. Based on discretionary management actions for surface disturbance on highly erosive soils and slopes exceeding 25 percent, projected long-term disturbance for BLM actions, and lack of requirements for certified weed-free seed for reclamation, current management (Alternative A) is anticipated to allow short- and long-term adverse impacts.

Livestock and Native Ungulate Grazing. Kay (1995) indicates that high densities of native ungulates can reduce or eliminate shrub seed production and impair recruitment of young shrubs. In addition, Hall and Bryant (1995) indicate that as vegetation stubble height is reduced, a shift in cattle preference and damage to vegetation can occur. The impacts described by Kay (1995) and Hall and Bryant (1995) would be expected to adversely impact INPS; however, the impacts described by these studies are expected to remain uncommon and occur in isolated instances within the planning area under all alternatives due to livestock grazing management and employment of guidelines associated with healthy rangeland standards (BLM 1998b).

The impacts of livestock and native ungulate grazing on INPS from all alternatives are anticipated to result in a mix of beneficial and adverse impacts. Short- and long-term beneficial impacts are anticipated from improvements to vegetative cover and plant vigor and control of INPS infestations that can occur under proper livestock grazing. Short- and long-term adverse impacts associated with livestock and native ungulate grazing are anticipated to occur primarily in animal concentration areas (e.g., water sources, trails, favored forage) and include transport of INPS seeds and propagates and disturbance of soil, creating habitats for the spread of INPS.

Because the acreage open to livestock grazing under all alternatives is similar (i.e., 6,016 acres closed to grazing for all alternatives) and because all alternatives would be managed in accordance with the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998b), the types of

adverse impacts from livestock grazing vegetation and soil disturbance are expected to be similar among alternatives. The number and distribution of native ungulates also are anticipated to be similar among alternatives. The difference in impacts from livestock and native ungulate grazing are anticipated to vary by alternative as a result of specific management actions, as described below.

The transport of INPS seeds and propagates by livestock and native ungulates occur when they attach to the animals' coats and feet or are ingested. One method to control the spread of INPS ingested by livestock is holding the animals in one area before they are allowed to move to other areas. A holding period of 72 hours allows the animals to flush the ingested INPS material from their systems so they will not transport the ingested material to uninfected areas. Alternative A does not require a holding period prior to moving livestock onto or within public lands. Therefore, Alternative A is expected to contribute to the spread of INPS seeds and propagates, via livestock, more so than alternatives that have a holding period (alternatives B, C, and E).

Currently, grazing allotments are evaluated to determine if they are meeting the standards for healthy rangelands. Approximately 10 percent of the grazing allotments are evaluated each year under Alternative A. Based on discretionary management actions, lack of a holding period for livestock, and the 10-percent annual evaluation of grazing allotments, current management (Alternative A) is anticipated to allow short- and long-term adverse impacts.

Fire Management. Beneficial and adverse, direct and indirect, short- and long-term impacts from fire management are anticipated under all alternatives. By destroying or damaging INPS plants and seeds, beneficial impacts can be realized based on the timing and location of fire. Conversely, adverse impacts from suppression activities that disturb soil and from fires that remove native vegetation and expose soil result in conditions that provide a seedbed for INPS establishment. The adverse impacts from fire management may be considered direct or indirect because the impact(s) may or may not occur immediately. Alternative A utilizes case-by-case management of heavy equipment use, fire suppression, and rehabilitation and stabilization following wildland fire. Moreover, Alternative A does not manage fuels in accordance with an established integrated management technique approach, does not advocate re-introduction of fire into fire adapted ecosystems within the planning area, and does not prohibit the use of prescribed fire on highly erosive soils. For the reasons stated, fire management under Alternative A is anticipated to have an adverse, short- and long-term impact within the planning area.

Recreation, OHV, and Dispersed Travel. Indirect, adverse, short- and long-term impacts from transportation of materials, people, and vehicles into and out of the planning area occur at recreation sites, trailheads, trails, and transportation routes. INPS are established in some of these areas and their seeds are spread to other areas by vehicles and people. Due to the permanent nature of most recreation sites, trails, and transportation routes, most associated adverse impacts are anticipated to be long-term. The resulting impact is the spread of INPS into new areas within the planning area. Restrictions to off-road, road, and other travel corridor use, would have to be initiated, and a comprehensive inspection and decontamination procedure for animals, equipment, materials, and vehicles would have to be adopted to completely halt the spread of INPS onto and within BLM-administered lands. However, some management actions (i.e., the use of certified weed-free seed, mulch, and forage) are available under this alternative to lessen the threat of INPS from being established via seed. Because Alternative A contains only minimal management actions to reduce or prohibit the introduction and transport of INPS, adverse short- and long-term impacts are anticipated to continue under the No Action Alternative.

Proactive Management Actions. Alternative A manages INPS on a case-by-case basis, whereas the action alternatives include some degree of proactive INPS eradication. For example, Alternative A does not include specific management actions to control habitat fragmentation. In addition, Alternative A currently has an inadequate INPS inventory, and conducts monitoring and treatment on a case-by-case

basis. The lack of adequate inventory and monitoring data prohibits accurate mapping of INPS distribution and encroachment, as well as prohibits risk assessment. The current management under Alternative A adversely impacts INPS on an estimated 952,100 acres (70%) of the planning area containing mostly scattered parcels of public land with scattered infestations of INPS. Without a comprehensive effort to control the spread of INPS, populations typically increase 14-percent annually (BLM 1985d). Ultimately, the spread of INPS is anticipated to exceed the point where it can be effectively controlled. Therefore, continuing current management under the No Action Alternative is anticipated to allow long-term adverse impacts regarding the control and spread of INPS.

Alternative B

Surface-disturbing Activities. Under Alternative B, NSO is allowed on highly erosive soils or on slopes greater than 25 percent. In addition, prescribed fire is prohibited on highly erosive soils under Alternative B.

Under Alternative B, the projected long-term disturbance acreage (11,565 acres) from BLM actions, following reclamation, would be the lowest of any alternative (see Appendix M). The projected long-term disturbance acreage for Alternative B is approximately 45-percent less when compared to Alternative A. Relative to Alternative A and other alternatives, Alternative B has the strictest requirements (i.e., one growing season completion, reseeding if less than 50% to 80% vegetative cover in 3 to 5 years, use of certified weed-free seed, and full topsoil salvage and segregation) regarding reclamation of disturbed areas.

The impacts from surface-disturbing activities under Alternative B are anticipated to be adverse, similar in type to Alternative A, and commensurate with the locations and intensity of RFAs shown in Appendix M. However, the intensity of adverse impacts from surface-disturbing activities under Alternative B are anticipated to be less than Alternative A and the least relative to all other alternatives.

Livestock and Native Ungulate Grazing. Alternative B's proposed management action allows the authorized officer, on a case-by-case basis, to hold livestock that ingested INPS material and seed for a period of 72 hours. This allows the animals to flush the ingested INPS material from their systems before being allowed to move on to or within public lands. The 72-hour holding and flushing period allowed by Alternative B is anticipated to reduce the adverse, indirect impacts associated with livestock transporting INPS relative to Alternative A and the least relative to all other alternatives.

Fire Management. Alternative B incorporates specific management actions to address heavy equipment use, fire suppression, and rehabilitation and stabilization following wildland fire. Moreover, Alternative B manages fuels in accordance with an established integrated management technique approach, would advocate re-introduction of fire into fire adapted ecosystems within the planning area, and would prohibit the use of prescribed fire on highly erosive soils. For the reasons stated, adverse short- and long-term impacts under Alternative B are anticipated to be less than Alternative A and the least relative to other alternatives.

Recreation, OHV, and Dispersed Travel. Under Alternative B, decreases in recreational and OHV and dispersed travel opportunities will correspondingly result in the decreased transport of INPS seed. Travel and use restrictions help lessen the adverse impacts resulting from INPS seed transport. Alternative B requires certified weed-free seed and native vegetation for reclaiming disturbed areas. These management actions are anticipated to have less adverse impacts relative to Alternative A and the least relative to other alternatives. See the OHV section in this chapter for more details involving limits to OHV use by alternative.

Proactive Management Actions. Alternative B proposes developing a comprehensive INPS management program consistent with or by adopting the provisions of Partners Against Weeds Plan (BLM 1996) and also proposes the most eradication acreage (1,700 acres) for salt cedar. Alternative B also proposes to control habitat fragmentation on 16 blocks of land primarily in public ownership. Under Alterative B, it is anticipated that the degradation of native vegetation communities and rangeland currently invaded by INPS would decline, and their spread to additional acres be more effectively halted or slowed compared to Alternative A. Designated weed-management areas established in the planning area are shown in Map 22 and include two categories for management of INPS: Level I Weed Management Areas comprise large blocks of public land where the emphasis is on containment of INPS and Level II Weed Management Areas comprise smaller blocks of public land containing small patches and isolated infestations, where the emphasis is on eradication and stopping invasion to uninfected areas. The described proactive management actions are anticipated to have more beneficial impacts relative to Alternative A and the most beneficial impacts relative to all other alternatives.

Alternative C

Surface-disturbing Activities. Under Alternative C, surface disturbance on highly erosive soils is minimized to the extent practicable and NSO is allowed on slopes greater than 25 percent with highly erosive soils. In addition, prescribed fire on highly erosive soils is restricted by season and intensity to limit impacts.

Under Alternative C, the projected long-term disturbance acreage (20,358 acres) from BLM actions, following reclamation, is less than, but within 3 percent of, the acreage projected for Alternative A (Appendix M). The projected long-term disturbance acreage for Alternative C is approximately 76-percent higher compared to Alternative B. Relative to Alternative A, Alternative C has more stringent reclamation requirements (i.e., three growing seasons completion, reseeding if less than 30% to 50% vegetative cover in 3 to 5 years, use of certified weed-free seed, and limited topsoil salvage and segregation) for disturbed areas.

The impacts from surface-disturbing activities under Alternative C are anticipated to be adverse, similar in type to Alternative A, and commensurate with the locations and intensity of RFAs shown in Appendix M. However, the intensity of adverse impacts from surface-disturbing activities under Alternative C is anticipated to be less compared to Alternative A.

Livestock and Native Ungulate Grazing. Alternative C includes a management action regarding a livestock flushing/holding period of 72 hours in the Level 1 Weed Management Area, and would allow for maintaining a protective cover of vegetation and litter with emphasis on the condition of allotments with highly erosive soils. These options are anticipated to reduce the adverse, indirect impact associated with livestock transporting INPS relative to Alternative A.

Fire Management. Alternative C incorporates similar, but less restrictive, management actions than those described for Alternative B. For the reasons stated, adverse, short- and long-term impacts under Alternative C are anticipated to be less than Alternative A, but more than Alternative B.

Recreation, OHV, and Dispersed Travel. Alternative C requires certified weed-free seed and native vegetation for reclaiming disturbed areas similar to Alternative B. The management actions described for Alternative C are anticipated to have less adverse impacts relative to Alternative A and similar impacts as described for Alternative B. See the OHV section in this chapter for more details involving limits to OHV use by alternative.

Proactive Management Actions. Alternative C proposes developing a comprehensive INPS management program as described for Alternative B; however, Alternative C proposes eradicating less

(1,275 acres) salt cedar and involving less control of habitat fragmentation than Alternative B. For the reasons stated above, Alternative C is anticipated to have more beneficial impact on the control and spread of INPS compared to Alternative A, but less than Alternative B.

Alternative D

Surface-disturbing Activities. Under Alternative D, surface disturbance on highly erosive soils and slopes greater than 25 percent is allowed. In addition, prescribed fire is allowed on highly erosive soils. Under Alternative D, the projected long-term disturbance acreage (22,080 acres) from BLM actions, following reclamation, is the most of any alternative (Appendix M). The projected long-term disturbance acreage for Alternative D is approximately 5-percent higher compared to Alternative A and 91-percent higher than Alternative B.

The impacts from surface-disturbing activities under Alternative D are anticipated to be adverse, similar in type to Alternative A, and commensurate with the locations and intensity of RFAs shown in Appendix M. The intensity of adverse impacts from surface-disturbing activities under Alternative D is anticipated to be greater than under Alternative A and the highest of any alternative.

Livestock and Native Ungulate Grazing. A livestock holding period is not required under Alternative D. Other management actions are similar to the current management. For these reasons, Alternative D is anticipated to result in similar adverse impacts (type and intensity) relative to Alternative A.

Fire Management. Alternative D would evaluate all fires and rehabilitate as needed for suppression and fire-severity impacts, including chemical treatment where INPS are present. For the reasons stated, adverse, short- and long-term impacts under Alternative D are anticipated to be less than Alternative A.

Recreation, OHV, and Dispersed Travel. Alternative D does not require BMPs or mitigation for reclaiming disturbed areas. These management actions are anticipated to have similar adverse impacts relative to Alternative A. See the OHV section in this chapter for more details involving limits to OHV use by alternative.

Proactive Management Actions. Alternative D does not require development of a comprehensive INPS management program; however, Alternative D does propose eradicating 850 acres of salt cedar. For the reasons stated above, Alternative D is anticipated to have more beneficial impact on the control and spread of INPS compared to Alternative A, but less than alternatives B and C.

Alternative E (Preferred Alternative)

Surface-disturbing Activities. Under Alternative E, surface disturbance on highly erosive soils is managed similarly to the actions described under Alternative C. Management of surface disturbance on slopes greater than 25 percent is allowed in the entire planning area with the BLM authorized officer's approval. Prescribed fire is limited under Alternative E, similar to the restrictions described under Alternative C. Under Alternative E, the projected long-term disturbance acreage (21,672) from BLM actions, following reclamation, is the second highest after Alternative D (Appendix M). The projected long-term disturbance acreage for Alternative E is approximately 3-percent higher compared to Alternative A and approximately 87-percent higher than Alternative B.

The impacts from surface-disturbing activities under Alternative E are anticipated to be adverse, similar in type to Alternative A, and commensurate with the locations and intensity of RFAs shown in Appendix M. The intensity of adverse impacts from surface-disturbing activities under Alternative E is anticipated to be less than the intensity described for Alternative A.

Livestock and Native Ungulate Grazing. A livestock holding period could be required under Alternative E in the Level 1 Weed Management Area only, which would most likely reduce the rate of INPS invasion in the planning area. Alternative E is anticipated to result in less adverse impacts relative to Alternative A, but more than Alternative B.

Fire Management. Alternative E evaluates all fires and rehabilitates suppression-related damage as needed, similar to Alternative D. For the reasons stated, adverse, short- and long-term impacts under Alternative E are anticipated to be less than under Alternative A and similar to Alternative D.

Recreation, OHV, and Dispersed Travel. Alternative E requires certified weed-free seed and, when practical, use of locally harvested seed for reclaiming disturbed areas. These management actions are anticipated to have less adverse impacts relative to Alternative A and similar impacts to Alternative C. See the OHV section in this chapter for more details involving limits to OHV use by alternative.

Proactive Management Actions. Alternative E requires developing a comprehensive INPS management program and managing habitat fragmentation similar to that described for Alternative B. Alternative E proposes to inventory and develop a treatment plan to eradicate salt cedar over the life of the plan. For the reasons stated above, Alternative E is anticipated to have more beneficial impact on the control and spread of INPS compared to Alternative A.

4.4.4.3 Conclusion

Meaningful differences in long-term disturbance acreage; surface disturbance and prescribed fire management on highly erosive soils and slopes greater than 25 percent; use of certified weed-free seed, timing, and reseeding requirements in reclamation of disturbed areas; management of livestock including holding periods, forage utilization, and grazing allotment evaluations; areas open, closed, and limited for OHV use; management of heavy equipment use for fire suppression, as well as rehabilitation and stabilization following wildland fire; requirements for a comprehensive INPS management program; and eradication of salt cedar form the basis for the following conclusion. Potential impacts from alternatives are anticipated to be similar in type, primarily adverse, short- and long-term, but different in intensity. Potential adverse impacts from Alternative D are anticipated to be the most adverse, whereas impacts from Alternative B are anticipated to be the least adverse. Potential impacts from alternatives C and E are anticipated to be similar in intensity and less than Alternative A.

4.4.5 Fish and Wildlife Resources – Fish

Actions that could occur through implementing each alternative could affect fish resources. This section describes the impacts of each alternative on fish resources in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as beneficial or adverse.

Both natural events and human activities that influence water quality and water quantity can produce beneficial or adverse impacts to fisheries habitat. Direct impacts can result from onsite disturbance to fisheries habitat. Indirect impacts can result from changes in water quality and quantity. Management actions that increase rates at which sediment is transported to and through streams increase deposition within the streams and could adversely impact fish. Refer to Appendix M for data regarding surface disturbance acreage and number of actions by alternative.

There are 10 species recognized by the WGFD as Status 1-3 (Native Species Status [NSS] 1-3) (refer to the Glossary), including lake chub, flathead chub, hornyhead chub, black bullhead, common shiner, finescale dace, pearl dace, plains topminnow, plains minnow, and suckermouth minnow (Appendix E) known to occur within the planning area. The impacts to NSS1-3 species are similar to the impacts described in this section.

In addition to their ecological importance, fish are a valuable resource for humans. Management actions that impact access to this resource for recreational use by the public would be a direct impact on fisheries management.

4.4.5.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Activities that cause substantial disturbance to soils and vegetation may adversely impact water quality and quantity, which adversely impacts fisheries habitat.
- Surface disturbances accelerate runoff and sediment delivery to stream channels, which alters streamflows and reduces habitat quality for fish that require clear water, moderated streamflows, and clean substrates.
- Increased sedimentation adversely affects most fish species in the planning area. This analysis, therefore, focuses on the degree of surface disturbance anticipated to occur under each alternative.
- Activities affecting water quantity are regulated by the Wyoming State Engineer's Office.
- Activities affecting water quality are regulated by the Wyoming DEQ.
- Management toward DPC is assumed to exceed the requirements of managing toward PFC.
- The potential for sedimentation of streams and rivers is minimized through using BMPs.

4.4.5.2 Analysis of Alternatives

Allowable uses and management potentially impacting fish include all surface-disturbing activities, concentrated livestock and native ungulate grazing, OHV use, fire management, and proactive management actions. Potential impacts to fisheries generally occur in two categories—water quality and water quantity—due to the limited number of fish-bearing stream segments occurring on public lands. These categories serve to organize the description of potential impacts for each alternative.

Impacts Common to All Alternatives

The types of impacts projected to occur to fish as a result of the various alternatives are similar; however, the intensity of impacts varies by alternative. Impacts to water quality and quantity are described in general below and in more detail in Water Resources in this chapter. Impacts to fish from changes in water quality and water quantity are described under individual alternatives.

Water Quality Impacts

Under all alternatives, fisheries resources could be affected by resource management actions that alter water quality through sedimentation and related degradation from surface-disturbing activities, water temperature changes, water chemistry changes, and riparian management and restoration.

Sedimentation of streams and rivers could be caused by any surface disturbance that removes vegetation and loosens the surface soil, which ultimately is deposited in streams and rivers. The amount of sediment that reaches streams and rivers depends on many factors, including slope gradient, soil type, sediment control measures, distance from the disturbance to the channel, and the type and amount of vegetative cover. The highest potential for surface disturbance under all alternatives is anticipated from BLM actions in fire management and ecology, mineral development, road construction, pipelines and powerlines, and vegetation treatments (Appendix M). Soil disturbance also could result from forest management activities, OHV use, livestock grazing, and the reclamation of disturbed areas.

Livestock and wildlife grazing can increase sediment entering streams from animal concentration areas, the collapsing of banks, stream-channel alteration, and removal of vegetation in riparian areas. Livestock and wildlife grazing in riparian areas can prevent regeneration of woody and herbaceous riparian vegetation necessary to stabilize streambanks. Soil disturbance from livestock grazing is minimized through implementing the *Standards for Healthy Rangeland and Guidelines for Livestock Grazing Management for Public Lands* (BLM 1998b) under all alternatives. In addition, salt, mineral, and other livestock supplements near riparian areas, wetlands, and other waters have the potential to adversely impact water quality.

Increased sediment in streams, rivers, and reservoirs decreases the potential for wild fish to naturally reproduce, fills in pools, leads to channel degradation, and increases stream temperatures. Changes in water temperature also would result from changes in the amount of vegetative cover. Changes in the aquatic habitat would lead fish to alter their uses of the stream, moving to different areas for feeding and spawning, depending on habitat conditions. Changes in water chemistry result from fire and fuels management and the use of retardant or foam near riparian areas and water sources.

Water Quantity Impacts

Water quantity may be impacted by activities that alter water runoff and water discharge. In areas with little vegetation, more rainfall may reach the stream systems because it does not infiltrate the soil. However, greater runoff can cause accelerated erosion and increased sediment loading in streams. Impervious surfaces and compacted soils may result in higher volumes of water reaching the stream system in shorter time periods, thus increasing flooding frequency, volume, and erosion.

Produced water from CBNG wells and conventional wells is sometimes discharged to the surface, contributing additional flows to the surface water system. These discharges can alter the timing, location, and volume of local streamflow patterns. Produced water discharge also can increase erosion rates in stream channels along with instream flows and augment sedimentation in streams. However, BLM policies and BMPs, required as conditions of approval, minimize and mitigate, to the extent possible, erosion resulting from produced water surface discharge. Aquatic species may be impacted by the amount of produced water discharge to the surface, especially during periods of low flow and spawning. Overall, however, the quantity of produced water is anticipated to be similar and have negligible beneficial and adverse impacts for all alternatives.

Surface water modeling conducted for the *Powder River Basin Oil and Gas Project Final EIS and Proposed Plan Amendment* (BLM 2002c) calculated discharge increases from produced water in major tributaries in CBNG development areas ranging between 7 and 15 cfs. In most watersheds, this increased discharge was predicted for much higher well numbers (greater than two orders of magnitude) and greater well densities than occur in the planning area (BLM 2003g). The surface water bodies receiving produced water discharges would be supplemented, but the amount of supplemental water reaching the surface water system would be determined by whether the produced water were discharged into impoundments or wetlands, injected into an aquifer, or allowed to flow to a stream.

Alternative A

Water Quality Impacts

Compared to Action Alternatives, Alternative A allows the second greatest acreage of BLM mineral estate (1,136,855 acres) open to oil and gas and other leasables with standard constraints. Some of this development is projected to occur in areas that drain into Class 1 or 2 streams. The State of Wyoming requires an antidegradation policy for Class 1 streams, whereas Class 2 streams require that the designated uses be sustained.

Other activities proposed under Alternative A that could result in surface disturbance and contribute to sedimentation include OHV use, the mining of coal and salable and locatable minerals, the development of wind-energy sites, and forest management. For example, Alternative A designates the smallest acreage closed to OHV use. In addition, Alternative A allows OHV use on highly erodible soils in the planning area. Without limits on the disturbance of these soils, OHV use could contribute sedimentation to surface water bodies. Structures associated with road and trail construction could intercept surface water runoff and divert sediment to the stream systems. Approximately 10 percent of the grazing allotments are evaluated each year to determine whether they meet the standards for healthy rangelands. Increased sedimentation resulting from the activities identified above would likely impact fisheries habitat within the planning area.

Water Quantity Impacts

Alternative A imposes the second fewest restrictions on activities that remove vegetation and compact soils. This would result in increased storm water runoff entering streams. This alternative is projected to have the highest number of federal wells drilled (i.e., 1,823 wells). Because approximately 25 percent of federal wells drilled are estimated to be CBNG, Alternative A is also expected to produce the most water associated with the development of CBNG wells.

Alternative B

Water Quality Impacts

Alternative B proposes less surface disturbance over the long term compared with Alternative A. Initially, surface disturbance would reclaim unnecessary roads, but over the long term, the reclamation should improve watershed health by reducing sedimentation created by the roads. Compared to Alternative A, fewer opportunities exist for surface-disturbing activities, including oil and gas development and forest management. More areas are designated as having NSO and CSU restrictions along perennial streams, riparian areas, and water bodies under this alternative. Alternative B restrictions on surface-disturbing activities and surface occupancy on highly erodible soils are expected to result in the least adverse impacts to Class I and II streams relative to Alternative A and other Action Alternatives. Alternative B is the only alternative without any acreage of highly erosive soils protected by minor or no restrictions (see Soils and Water sections).

Under this alternative, the Bates Hole SMA would be created to protect highly erosive soils and watershed values. Formation of this SMA is expected to have beneficial impacts on water quality in Bates Hole and the North Platte River.

Adverse impacts to water quality from OHV use are expected to be less under Alternative B than under Alternative A due to upgrades, rerouting, or closure of roads and trails causing excessive erosion. With the most area closed to OHV use, the most area limited to designated roads and trails for OHV use, and the least area limited to existing roads and trails for OHV use, Alternative B is anticipated to result in the least adverse impacts to water quality compared to Alternative A and other Action Alternatives. The use of prescribed fire on highly erosive soils is prohibited under Alternative B, which provides some limitations on damage to vegetation that helps minimize erosion and reduce sedimentation in surface water bodies. The stringent requirements to revegetate all disturbed areas within one growing season reestablish soil cover more quickly than under Alternative A, also resulting in fewer opportunities for soil erosion and sedimentation. Other restrictions on surface disturbance proposed under Alternative B that would minimize potential impacts to surface water quality through sedimentation include (1) the establishment of larger areas that limit the extraction of salable minerals around bald eagle roost sites, especially in areas with highly erodible soils; (2) opening fewer areas to renewable energy development;

and (3) the prohibition of new road and trail construction. All rangelands are managed to maintain healthy and vigorous vegetation and minimize soil erosion.

Alternative B implements riparian habitat improvements, including restoring 108 miles of incised streams, restoring 90 acres of lentic habitat, improving floodplain connectivity and function on 350 stream miles, and managing 350 miles of lotic and adjacent riparian habitat and 10,000 acres of lentic habitat for DPC. The restrictions on surface-disturbing activities under Alternative B, along with proposed actions to improve riparian habitat in selected streams, reduce impacts to water quality and fish habitat compared to Alternative A and benefit fisheries in the planning area.

Water Quantity Impacts

Alternative B results in the least amount of change to surface water quantity because the fewest federal wells are drilled (190 wells) and more restrictions on surface-disturbing activities are implemented than under Alternative A or any of the other alternatives. Alternative B proposes constructing 1,000 acres of fish and wildlife reservoirs in the planning area, more than Alternative A and other Action Alternatives. While additional reservoirs are anticipated to benefit planning area fisheries and provide additional recreation opportunities to the public compared to Alternative A, water depletion from new reservoirs may adversely impact downstream species in the Platte River (see Special Status Species section). Water depletion to the Platte River System is anticipated to be greatest under Alternative B relative to Alternative A and other Action Alternatives.

Alternative C

Water Quality Impacts

Alternative C is expected to produce approximately 1,301 less acres of short-term surface disturbance relative to Alternative A and approximately 22,000 more acres compared to Alternative B. Alternative C's proposed restrictions on highly erodible soils and reclamation requirements are anticipated to result in less adverse impacts to water quality compared to Alternative A, but more than Alternative B.

Water Quantity Impacts

Alternative C proposes constructing 500 acres of fish and wildlife reservoirs in the planning area, half of the acreage proposed under Alternative B and 500 acres more than proposed under Alternative A. Fish and wildlife reservoirs are anticipated to benefit fisheries in the planning area compared to Alternative A, but may adversely impact downstream species in the Platte River (see Special Status Species section). Water depletion to the Platte River System is anticipated to be greater under Alternative C relative to Alternative A.

Alternative D

Water Quality Impacts

Alternative D has the most potential of all alternatives to degrade water quality through increased sedimentation due to having the least restrictions on surface-disturbing activities. Surface disturbance on highly erosive soils and on slopes greater than 25 percent is allowed, the largest number of acres are open to mineral development and subjected to the fewest requirements for reclamation and revegetation activities. OHV restrictions are similar to those described under Alternative A, but more area would be closed to OHV use under Alternative D so the potential for surface disturbance and sedimentation from OHV use would be slightly less. Alternative D restores 33 miles of incised streams compared to Alternative A. Because similar acreage of surface disturbance and similar restrictions are proposed by Alternative D, the anticipated impacts to water quality are anticipated to be similar to Alternative A.

Water Quantity Impacts

Alternative D proposes constructing 100 acres more of fish and wildlife reservoirs in the planning area as compared to Alternative A, but only 10 percent of the acreage proposed by Alternative B. Fish and wildlife reservoirs are anticipated to benefit fisheries in the planning area compared to Alternative A, but may adversely impact downstream species in the Platte River (see Special Status Species section). Water depletion to the Platte River System is anticipated to be greater under Alternative D relative to Alternative A.

Alternative E (Preferred Alternative)

Water Quality Impacts

In the short and long term, surface disturbance from BLM actions are similar under alternatives E and A. Under Alternative E, disturbance on highly erodible soils is anticipated to be less than in Alternative A, potentially causing less sedimentation in fisheries habitat. Alternative E specifies more measures to protect water quality compared to Alternative A.

Water Quantity Impacts

Alternative E proposes constructing 100 acres more of fish and wildlife reservoirs in the planning area as compared to Alternative A, but only 10 percent of the acreage is proposed by Alternative B. Fish and wildlife reservoirs are anticipated to benefit fisheries in the planning area compared to Alternative A, but may adversely impact downstream species in the Platte River System (see Special Status Species section). Water depletion to the Platte River System is anticipated to be greater under Alternative E relative to Alternative A.

4.4.5.3 Conclusion

Alternatives A and D have the greatest potential of adverse impacts to fisheries because these alternatives have the largest areas open to mineral development and the least restrictions on surface-disturbing activities. Alternative B results in the least adverse impacts to fisheries due to more restrictions on surface-disturbing activities and the potential of limiting activities for the entire length of the North Platte River. Compared to Alternative A, limitations on surface disturbance and mineral development under Alternative B lessen degradation of water quality; however, proposed new fish and wildlife reservoirs under Alternative B deplete more water to the Platte River system. Alternative C provides similar beneficial impacts as under Alternative B, but similar to other alternatives, Alternative C could still allow surface-disturbing activities on highly erodible soils, contributing more sediment to the streams and adversely impacting watershed health more than Alternative B. Alternative E provides slightly more beneficial impacts to fisheries by limiting surface disturbance on highly erodible soils compared to Alternative A, but less than Alternative B.

4.4.6 Fish and Wildlife Resources – Wildlife

Actions that remove, degrade, or fragment wildlife habitat are considered adverse. Beneficial impacts include actions that conserve or improve habitats, such as big game crucial winter range, nest sites, or leks.

Direct impacts to wildlife could result from the loss of habitat or key habitat features, such as a nest site or lek area, or from the immediate loss of life. Wildlife also can be directly disturbed by human activities, potentially causing wildlife to abandon a nest, lek, or home range. Disturbance during sensitive periods (e.g., winter, nesting) is known to adversely impact wildlife. Human activities, such as OHV use, recreation, and noise from equipment associated with development and surface-disturbing activities, impact some wildlife species. These activities are considered to be particularly detrimental to nesting and lekking grouse, nesting raptors, and wintering big game. Disturbance impacts range from short-term

displacement and shifts in activities to long-term abandonment of home range (Yarmaloy et al. 1988; Miller et al. 1998; Connelly et al. 2000).

Habitats can be lost and fragmented by activities such as vegetation treatments; fire management and ecology; mineral exploration and extraction; construction and maintenance of roads and trails; and development of wind-energy facilities.

Indirect impacts to wildlife can occur by changing habitat characteristics or quality. Habitat quality can be impacted by various surface-disturbing activities and other actions that remove vegetation and disturb soil. Indirect impacts to potential habitats for wildlife also could occur when specific actions change the habitat in a way that would make it unsuitable for future habitation.

For the purpose of this analysis, short-term impacts to wildlife are activities that an individual or species respond to immediately, but do not affect the population viability of the species. For example, many disturbance impacts are short term in that a species may temporarily abandon an area, nest, or lek, but return immediately following the cessation of the disturbance, such as a passing by OHV. Short-term construction may cause an animal to abandon an area, nest, or lek, but the wildlife are often able to return to the area and reproduce successfully the following season. Refer to Maps 20 and 21 for vegetation types and to Maps 23 and 24 for wildlife.

4.4.6.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- BLM is responsible for managing habitat, whereas state and federal wildlife management agencies (e.g., WGFD, USFWS) oversee management of wildlife species. Therefore, this analysis primarily relies on changes to vegetation types to estimate impacts to wildlife habitat.
- For each alternative, changes to vegetation types, either in quantity, quality, or increased fragmentation, are compared to baseline conditions. Adverse and beneficial impacts to vegetation types (i.e., wildlife habitats) are assumed to have a corresponding adverse or beneficial impact on wildlife species.
- Disturbance impacts to wildlife are evaluated by comparison to current management practices in the planning area; increased protection in time or space are beneficial, where as reduced protection result in adverse impacts.
- Diverse and optimal habitats foster healthy, abundant, and diverse biological communities.
- Disturbance during sensitive periods adversely impacts wildlife.
- Habitat fragmentation adversely impacts wildlife.
- BLM controls livestock grazing only on BLM surface lands.
- Prescribed fire is a tool used to manage vegetative communities and can result in short-term adverse impacts with long-term beneficial impacts to wildlife and wildlife habitats.
- Forest management actions managing wildlife habitat instead of or in addition to managing forest products are anticipated to benefit wildlife habitats.
- Management actions aimed at benefiting specific wildlife species can have adverse or beneficial impacts on other wildlife species.
- Alternatives with a larger acreage managed toward DPC will exhibit a correspondingly greater benefit to wildlife than alternatives managing a smaller number of acres toward DPC. Management toward DPC is assumed to exceed the requirements of managing toward DFC.
- Alternatives with a larger number of acres of surface water developed will exhibit a greater benefit to migratory gamebirds and other riparian/wetland wildlife species when compared to alternatives with smaller acreage of surface water developed.

- The potential for adverse and beneficial impacts to wildlife is anticipated to be commensurate with the intensity of allotment monitoring and the amount of forage utilization from livestock grazing in the planning area.
- Alternatives providing the greatest protection of water sources beneficial to wildlife are anticipated to have the greatest benefit to wildlife.
- The more acreage of habitat protected from fragmentation, the greater the benefit to big game and other wildlife species.
- Surface disturbance causes adverse impacts to wildlife habitats. Lesser amounts of surface disturbance in wildlife habitats have a corresponding lesser adverse impact to wildlife compared to more surface disturbance.
- Alternatives proposing to protect the most habitat from fragmentation are anticipated to have the most beneficial impact on wildlife.
- The greater the distance from development that baiting for trophy game is allowed, the less conflict will occur between trophy game and people. Correspondingly, the larger the amount of prohibited acreage, the greater the beneficial impact will be to trophy game.
- Prohibiting surface disturbance or occupancy is more restrictive and provides more protection for wildlife than avoiding surface disturbance or occupancy.
- The more surface disturbance that occurs on steep slopes or on highly erosive soils, the greater the potential for adverse impacts to wildlife habitat.
- The higher the road density in the planning area, the greater the potential to degrade adjacent wildlife habitat quality in the planning area.
- All known raptor nests from BLM's GIS database were used in the analysis and all raptor nests of unknown species are assumed not to be special status species.
- The exact locations of future surface-disturbing activities cannot be predicted at the RMP level. For analysis purposes, surface-disturbing activities are assumed to occur in vegetation types in proportion to their availability within the planning area. Impact acreage for vegetation types are not absolute, but serve as a relative comparison among alternatives.
- Conversion of wells for wildlife and livestock are anticipated to benefit the distribution and health of wildlife within the planning area.
- The more area used by OHVs and the higher the density of OHV use, the more adverse impacts are anticipated to wildlife habitat.
- BLM will utilize best available information, management and conservation plans, and other research and related directives, as appropriate, to guide wildlife habitat management on BLM-administered lands (see Appendices B and K).

4.4.6.2 Analysis of Alternatives

Allowable uses and management actions that could impact wildlife habitat include all surface-disturbing activities, concentrated livestock grazing, fire management and ecology, forest management, INPS, OHV use, recreation, transportation, and proactive management actions.

Impacts Common to All Alternatives

The impacts projected to occur to wildlife as a result of the various alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative. Therefore, impacts to wildlife from surface-disturbing activities, concentrated livestock grazing, fire management and ecology, forest management, INPS, OHV use, recreation, transportation, and proactive management actions are described under individual alternatives. For organization purposes, impacts to wildlife from alternatives generally are

grouped into categories of surface-disturbing activities, wildlife-disturbing activities that remove vegetation and disturb soil, spread of INPS, transportation, and proactive management actions anticipated to impact wildlife. The impacts described for each alternative are organized according to the statutory wildlife categories described in the Fish and Wildlife Resources – Wildlife section in Chapter 3.

Table 4-8 summarizes the anticipated short- and long-term surface disturbance from BLM actions in the planning area over the life of the plan. RFAs contributing to this surface disturbance are identified in Appendix M. Because the precise location of foreseeable actions in the planning area is not known at this time, Table 4-8 and associated types of development were used to estimate the relative impact of alternatives on statutory categories of wildlife. Please note, with the exception of the title, this is the same table as Table 4-1, included here for the reader's benefit.

Table 4-8. Reasonable Foreseeable Actions – Surface Disturbance Acres in the Casper Planning Area

Restriction	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Total Acres Short-Term Disturbance from BLM Actions	59,990	36,650	58,689	63,649	61,274
Total Acres Reclaimed from BLM Actions	38,903	25,085	38,331	41,569	39,602
Total Acres Long-Term Disturbance from BLM Actions	21,087	11,565	20,358	22,080	21,672

Source: Appendix M, Table M-1
BLM Bureau of Land Management

Animal damage control is conducted by U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) Wildlife Services and would not differ among alternatives (BLM 1994a). Animal damage control typically applies to coyote, red fox, and skunk. No difference in adverse impacts to predatory animals is anticipated across alternatives.

Potential impacts to wildlife species are anticipated from surface-disturbing activities, wildlife-disturbing activities that remove vegetation and disturb soil, spread of INPS, and proactive management actions. Although lumped for discussion purposes, under surface disturbance, oil and gas development is anticipated to be the greatest single contributor to disturbance of wildlife habitat in the planning area. The WGFD (2004b) provides a more thorough discussion of the impacts of oil and gas development on crucial and important wildlife habitats. At various intensities, the actions of all alternatives could adversely impact wildlife through the loss, degradation, and fragmentation of habitats, and benefit wildlife through the protection, enhancement, and restoration of habitat. Potential impacts from each category of activities are described below as they apply to all alternatives and to all statutory wildlife categories.

Surface-disturbing Activities. Because the precise location of surface disturbance from alternatives is unknown and because wildlife species utilize more than one vegetation type, the degrees of impacts to wildlife from surface disturbance are anticipated to be directly related to the amount of surface disturbance. Long-term surface disturbance accounts for reclamation of some lands following short-term disturbance. Although reclamation restores habitats, thereby reducing long-term surface disturbance acreage, the location of permanent facilities (e.g., roads, well pads, etc.) adjacent to reclaimed areas can reduce the utility of reclaimed habitats. For example, the higher the density of permanent facilities in an area, the more a habitat is fragmented and the more adverse impact anticipated for wildlife. Table 4-9 summarizes select conservation measures anticipated to offset some of the impacts to habitats.

Table 4-9. Summary of Select Conservation Measures and Potential Habitat Impacts for Wildlife

Actions Affecting Wildlife	Acreage Type	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Buffer Acres Around Raptor Nests	Total Area	82,938-157,220	82,940-270,914	82,940-270,913	82,940-257,625	82,940-257,625
	BLM-Administered Surface	82,938-123,622	64,572-213,876	64,572-213,875	64,572-204,177	64,572-204,177
Acres Closed to OHV Use	BLM-Administered Surface	2,661	26,027	7,943	2,661	2,224
Acres Open to OHV Use	BLM-Administered Surface	187	242	285	285	285
Acres Limited to Existing Roads and Trails for OHV Use	BLM-Administered Surface	1,311,715	909,651	1,162,113	1,292,630	1,162,244
Acres Limited to Designated Roads and Trails for OHV Use	BLM-Administered Surface	47,014	425,657	191,236	66,001	196,824
Sharp-Tailed Grouse Strutting/Dancing Ground Buffer Acres	Total Area	500	2,012	Same as Alternative A	Same as Alternative A	Same as Alternative A
	BLM-Administered Surface	0	0	Same as Alternative A	Same as Alternative A	Same as Alternative A
Sharp-Tailed Grouse Nesting and Early Brood-Rearing Buffer Acres	Total Area	32,134	121,672	Same as Alternative A	Same as Alternative A	Same as Alternative A
	BLM-Administered Surface	80	1,672	Same as Alternative A	Same as Alternative A	Same as Alternative A
Acres Protected from Habitat Fragmentation	Total Area	0	660,498	279,305	0	192,545
	BLM-Administered Surface	0	413,552	177,035	0	131,879
	BLM-Administered Minerals	0	580,007	238,724	0	168,386
Acres Protected from Habitat Fragmentation by Vegetation Types						
Agricultural Lands (Altered by Human)	Total Area	0	3	3	0	0
	BLM-Administered Surface	0	0	0	0	0
Grasslands	Total Area	0	175,000	85,552	0	64,302
	BLM-Administered Surface	0	109,692	52,589	0	40,032
Desert Shrublands (Including Greasewood)	Total Area	0	137,327	18,252	0	5,115
	BLM-Administered Surface	0	83,675	9,652	0	2,902

Table 4-9. Summary of Select Conservation Measures and Potential Habitat Impacts for Wildlife (Continued)

Actions Affecting Wildlife	Acreage Type	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Mountain Shrubland	Total Area	0	37,495	37,610	0	32,325
	BLM-Administered Surface	0	27,318	27,350	0	23,380
Riparian	Total Area	0	9,701	3,234	0	2,104
	BLM-Administered Surface	0	3,086	115	0	107
Rock Outcrops/Badlands	Total Area	0	3,087	3,095	0	2,001
	BLM-Administered Surface	0	2,962	2,967	0	1,952
Sagebrush	Total Area	0	241,450	97,976	0	63,082
	BLM-Administered Surface	0	146,598	58,418	0	44,510
Acres Managed for DFC or DPC for Aspen	BLM-Administered Surface	DFC 2,822	DPC 2,822	DPC 1,411	DPC 706	DPC 2,822
Acres Managed for DFC or DPC for Sagebrush	BLM-Administered Surface	DFC 630,183	DPC 630,183	DPC 315,902	DPC 157,546	DPC 630,183
Acres Managed for DFC or DPC for Mountain Shrub	BLM-Administered Surface	DFC 46,779	DPC 46,779	DPC 23,390	DPC 11,695	DPC 46,779
Acres Managed for DPC: Miles of Lotic/ Acres of Lentic Habitat	BLM-Administered Surface	PFC 350/10,000	DPC 350/10,000	DPC 175/5,000	DPC 88/2,500	DPC 350/10,000
Incised Stream Miles/Lentic Habitat Restored	BLM-Administered Surface	N/A	108/90	75/47	33/43	Same as Alternative D
Stream Miles of Improved Floodplain Connectivity	BLM-Administered Surface	N/A	350	108	75	75
Acres of Salt Cedar Eradication Proposed	BLM-Administered Surface	N/A	1,700	1,275	850	Inventory and Develop a Plan
Livestock Holding/Flushing Period for INPS Control	BLM-Administered Surface	0	72 hours	72 hours	0	72 hours
Acres of Proposed Surface Water for Fish and Wildlife	BLM-Administered Surface	1,500	2,500	2,000	1,600	1,600

BLM Bureau of Land Management
DFC Desired Future Condition
DPC Desired Plant Community
N/A Not Applicable
PFC Proper Functioning Condition
OHV Off-highway vehicle
INPS Invasive nonnative plant species

In addition to temporarily or permanently removing wildlife habitats, surface disturbance can degrade the quality of adjacent habitats. For example, erosion and runoff from surface disturbance can extend onto adjacent habitats, thereby causing additional soil erosion. Moreover, dust from surface disturbance can cover adjacent vegetation, thereby reducing photosynthesis and (or) the palatability of vegetation. Depending on the intensity of degradation, season, and health condition of wildlife using the habitat, reductions in habitat quality can have short- and long-term impacts to wildlife. For example, Towry (1984) indicates that deficiencies in summer range habitat quality can lead to mortality of wildlife in the winter and reduce reproductive success in mule deer.

Surface-disturbing actions typically require BMPs to avoid or minimize impacts to soil resources and, ultimately, to habitat. Temporary protective surface treatments can benefit reclamation of habitats on steep slopes or on soils with high potentials for water or wind erosion because these areas are more difficult and often take more time to reclaim compared to other areas.

Once surface disturbance occurs, timely reclamation is important to avoid or minimize soil erosion and the spread of INPS. The longer reclamation takes to restore disturbed areas, the greater the adverse impact is to habitat and wildlife species.

Management of runoff from roads and other impervious surfaces or disturbed areas is an example of impacts from surface disturbance that can be short-term and long-term. Multiple disturbances on steep slopes or highly erosive soils are anticipated to exacerbate habitat degradation by soil erosion and runoff into wildlife habitats.

Vegetation treatments, such as silviculture, are used to manage forests that can, in turn, impact wildlife habitats. McAninch et al. (1984) observe that forest clear-cuts alter wildlife habitats more than other silviculture treatments because they set back plant succession to an early stage, disturb soil, alter microclimatic conditions, and completely remove forest habitats.

Roads remove vegetation and disturb soil when they are constructed and thereafter. Forman et al. (2003) identify mortality, habitat loss, and reduced habitat connectivity as the three impacts roads have on wildlife. Mortality of wildlife and loss of habitats due to road construction are direct impacts; vehicle speed and traffic volume have generally increased the mortality of wildlife due to vehicle collisions (Forman et al. 2003).

Road construction also causes habitat loss by converting wildlife habitats to permanent road surfaces and ROWs (Forman et al. 2003). In addition, because roads typically are void of vegetation and exhibit impervious surface or compacted soil, they often promote increased surface runoff and lead to soil erosion and transport of pollutants to nearby streams, wetlands, or riparian areas.

In addition to direct impacts, roads also contribute to habitat fragmentation and can establish barriers to some wildlife species. For example, Towry (1984) indicates that roads generally decrease habitat quality for mule deer for a distance of ½ mile on either side of the road. Forman et al. (2003) acknowledge that buffer areas around roads generally are avoided by ungulates and large carnivores. Forman et al. (2003) also identify two wildlife responses to roads and their associated disturbances: numerical responses and behavioral responses. Numerical responses pertain to reductions in wildlife abundance or density; behavioral responses pertain to wildlife that has learned to avoid roads. While the impacts identified are considered adverse, roads can also create beneficial impacts to wildlife. For example, exclusion fencing along roads can increase the amount of forage available to small mammals (Forman et al. 2003).

In addition to roads, ROWs and corridors occur in the planning area under all alternatives and impact wildlife in varying ways. For example, utility poles benefit raptors and other birds by providing perching

or nesting structures; however, these same utility structures also can cause mortality in raptors through electrocution and collisions (USFWS 2002a). In addition to raptors, other species, such as ravens, crows, magpies, small flocking birds, and wading birds, are subject to electrocution by utility structures (USFWS 2002a). Erecting artificial nest platforms on utility structures may benefit birds such as osprey, eagles, and hawks, and nest boxes constructed on utility structures may benefit cavity-nesting birds (e.g., bluebirds) and bats (USFWS 2002a).

Wildlife-disturbing Activities. Planned and unplanned wildland fire removes vegetation and disturbs soils. Although wildland fire adversely impacts wildlife habitats in the short term by removing vegetation and disturbing soil, the long-term benefits of wildland fire often outweigh the short-term adverse impacts. For example, prescribed fire can be used to restore conditions benefiting wildlife species favoring early plant succession stages and young age classes of woody plants (McAninch et al. 1984). Wallmo (1980) suggests that fire improves the palatability of forage and fire causes browse plants to resprout close to the ground, putting the current season's growth within reach of deer for several years.

Fire suppression removes vegetation and disturbs soil and can have both short- and long-term impacts to big game and other habitats. For example, using heavy equipment to construct fire lines can cause habitat loss, degradation, and fragmentation in the short term. Moreover, if not rehabilitated, these fire lines can cause erosion and provide opportunities for the spread of INPS, thereby resulting in long-term adverse impacts to wildlife habitat. Timely rehabilitation following fire, therefore, is important to maintaining the quality of wildlife habitats.

Wildland fire can also have beneficial and adverse impacts to wildlife habitats. For example, fuels tend to build under repeated fire suppression, sometimes resulting in intense wildland fires that can cause long-term adverse impacts to wildlife habitats. Repeated fire suppression in forests also can result in encroachment of fire-induced wildlife habitats (Wishart 1980). On the other hand, wildland fire can improve the quality of wildlife habitat by releasing soil nutrients, reducing fuel load, or setting back trees encroaching into shrubland or grassland habitats. Preparing wildland fire use plans and coordinating with adjacent land owners prior to prescribed or wildland fires can provide opportunities for taking advantage of the benefits wildland fire can provide to wildlife habitat.

OHV use is another wildlife-disturbing activity which, through removal of vegetation, disturbance of soil, and transport of INPS, can degrade wildlife habitats. In addition to direct impacts of vegetation removal and soil disturbance, the disturbance to wildlife associated with OHV use includes the movement and noise from vehicles and riders. In addition to OHV use, construction, mineral exploration and extraction, recreation, and vehicles traveling on roads can cause noise that adversely impacts wildlife.

Some species of wildlife are more sensitive to noise and disturbance than other species, while other species habituate to types of noise or disturbance. For example, The Nature Conservancy (TNC 2000) indicates that male sharp-tailed grouse "…are tolerant of a variety of disturbance but are displaced by human presence." On the other hand, certain magnitudes and frequency of noise may interrupt wildlife communication and adversely impact wildlife. For example, Brattstrom and Bondello (1983) found that the magnitudes and frequencies of occurrence of intense off-road vehicle use in the California desert constitute a potential threat to the well-being of the desert kangaroo rat. In addition, Bowels (1995) indicates that wildlife can abandon habitats or expend energy as a result of disturbance and can continue to exhibit a response even when they have adapted to the disturbance. Depending on the intensity and frequency of occurrence of the disturbance, incurring energetic expense due to human disturbance during critical periods (e.g., winter) can impact wildlife survival and productivity. USFWS (2002) identifies courtship, nest construction, incubation, and early brooding as higher risk periods in the life-cycles of raptors when adults are more prone to abandoning nests due to disturbance. USFWS (2002) also indicates that human activities resulting in disturbance to raptors can cause population declines. In

general, the more area that is subject to noise and human-disturbing activities, such as intense OHV use, or the higher the density of these activities, the more disturbance and adverse impacts to wildlife habitats are anticipated.

Livestock grazing is a wildlife-disturbing activity that through removal of vegetation, disturbance and compaction of soil, and transport of INPS can degrade wildlife habitats. Aside from transporting INPS, the most impact to wildlife habitats from livestock is anticipated in concentrated areas, such as water sources and riparian areas. Proper management of livestock grazing, deferring grazing on pastures exposed to wildland fire, monitoring forage utilization, and managing allotments to healthy rangeland standards can avoid or minimize adverse impacts to wildlife.

The spread of INPS contributes to loss of wildlife habitats, increased soil erosion, reduced water quantity and quality, and reduced structural and species diversity. Controlling the spread of INPS is necessary to maintain the carrying capacity of wildlife habitats. Comprehensive management plans including controlling and monitoring the spread of INPS are anticipated to be effective in controlling the adverse impacts of INPS. Targeting and eradicating INPS particularly detrimental to certain wildlife habitats are anticipated to benefit wildlife. For example, salt cedar is an INPS often found adjacent to or within water courses, wetlands, and riparian areas, habitats that are important to numerous wildlife species. If the spread of INPS in the planning area continues, adverse impacts to wildlife habitats are anticipated to be commensurate with the amount of wildlife habitat affected.

Proactive Management Actions. All alternatives propose to manage aspen, sagebrush, mountain shrub, lentic, lotic, and forest habitats in the planning area. The focus of management and the acreage managed varies by alternative.

A proactive management action under all alternatives is the annual prohibition of surface development from November 15 through April 30 on all big game crucial winter ranges (see Maps 23 and 24). The exceptions to this restriction vary by alternative; however, in general, this restriction is anticipated to benefit big game.

Habitat fragmentation is a condition resulting from actions dissecting and isolating habitats. All alternatives protect wildlife habitats to some degree. Developing ROWs and corridors, roads, fences, wind energy, minerals, recreational facilities, and urban areas all contribute to habitat fragmentation. The impacts of fragmentation include, but are not limited to, reduction in biological diversity, habitat isolation, impediments to movement, and, in some cases, mortality.

Management actions and allowable uses that protect surface water from impacts associated with soil erosion and pollutants are anticipated to benefit wildlife habitats. In arid climates such as the planning area, the distribution and quality of water are important factors in the distribution and health of wildlife.

Wildlife species that use water sources and riparian/wetland habitats benefit from management actions common to all alternatives that promote protecting, developing, restoring, and improving water sources. For example, the BLM will, on a case-by-case basis, convert suitable abandoned oil and gas wells to water supply wells for use by wildlife and livestock as appropriate.

All alternatives will continue to manage public lands within the Table Mountain (1,549 acres), Springer/Bump-Sullivan (593 acres), and Rawhide (200 acres) areas in accordance to the WGFD's Wildlife Management Areas (WMA), which have specific goals benefiting waterfowl and riparian and wetland habitats. Transfer of these areas to WGFD under some alternatives is not anticipated to have measurable differences in impacts to wildlife across alternatives.

Alternative A

Potential impacts to statutory wildlife categories are described in this section in relation to the allowable uses and management actions comprising Alternative A and in the context of the types of impacts described in Impacts Common to All Alternatives earlier in the Fish and Wildlife Resources – Wildlife section.

Surface-disturbing Activities. Alternative A requires BLM to evaluate all surface-disturbing activities to determine the need for BMPs to minimize impacts on soil resources on a case-by-case basis; however, there is no requirement to apply BMPs to all surface-disturbing activities. Alternative A also considers NSO or other disturbance on slopes greater than 25 percent. Moreover, Alternative A has the most BLM-administered surface with high potential for water erosion and the second most BLM-administered surface with high potential for wind erosion subject to no or only minor restrictions on surface-disturbing activities. Alternative A generally controls the spread of INPS on a case-by-case basis without the use of a comprehensive planning area-wide management plan.

Wildlife-disturbing Activities. Alternative A uses prescribed burning to manipulate vegetation to benefit the BLM's range, forestry, and wildlife programs. Under Alternative A, the BLM develops wildland fire use plans on a case-by-case basis for those areas where prescribed fires are planned; however, to implement the plan, cooperative agreements are needed with adjacent private landowners and other fire and land management agencies. Wildland fire use plans offer the opportunity to treat vegetation for the benefit of wildlife and other resource programs.

Alternative A generally does not allow use of heavy equipment to construct fire lines in elk crucial winter range. Alternative A also requires consultation with the BLM wildlife biologist when fire threatens elk crucial winter range. If heavy equipment is used to construct fire lines, rehabilitation work begins immediately under Alternative A. In other cases, where no specific plan decisions are identified, rehabilitation and stabilization following wildland fire are performed on a case-by-case basis. Alternative A uses full suppression of wildland fires within forestlands, which contributes to fuel loading. In general, fire, suppression activities, and rehabilitation post wildland fire are anticipated to have adverse and beneficial impacts to big game habitat under Alternative A.

Proactive Management Actions. Alternative A includes proactive management actions anticipated to benefit wildlife within the planning area. For example, Alternative A proposes to manage aspen communities in the planning area toward DFC. For other woodland communities, Alternative A strives to achieve DFC on a case-by-case basis. Aspen provide important forage and cover for big game, so management of this community is important to maintaining vigorous and productive aspen stands. Alternative A also manages forests and proposes to develop detailed timber-management activity plans for 17 FMAs. Forest management under Alternative A uses silviculture treatments to achieve stand vigor. In general, forest management and silviculture treatments under Alternative A are anticipated to have adverse and beneficial impacts to big game. Alternative A also proposes to achieve DFC in sagebrush and mountain shrub communities. Both of these communities are used by wildlife, and achieving DFC on all acreage within the planning area is anticipated to benefit wildlife.

Under Alternative A, the BLM may grant exceptions, waivers, or modify restrictions in big game crucial winter range in writing (see Appendix F). These restrictions do not apply to maintaining existing facilities. In addition, no surface development is allowed on certain parcels of Muddy Mountain elk crucial winter range. Although exceptions can be granted, this management action is anticipated to benefit elk.

As developing resources and resource use increases in the planning area, continued habitat fragmentation—a detriment to big game and other wildlife—is anticipated. Alternative A does not specifically identify proactive management actions to avoid or minimize the adverse impacts from habitat fragmentation.

Alternative A does provide some protection of surface water from impacts associated with soil erosion and runoff from disturbed areas and from other actions by prohibiting surface occupancy (NSO) within ¼ mile of the North Platte River; within 500 feet of live streams, lakes, reservoirs, canals and associated riparian habitat; and within 500 feet of water wells, springs, or artesian and flowing wells. In some cases, Alternative A requires the fencing of wells and reservoirs to exclude livestock or wildlife to avoid the degradation of these water sources. Ducks Unlimited (2004) indicates that concentrations of livestock around wetlands, especially in the summer, can have localized impacts on wetland habitats important to waterfowl. Older water source developments (e.g., wells and springs) are redeveloped under Alternative A as issues arise or springs become nonfunctional. These restrictions are anticipated to benefit water quality and wetland and riparian areas.

Management of runoff from roads and other impervious surfaces or disturbed areas is accomplished under Alternative A through Stormwater Management Program (SWMP) for all new BLM actions disturbing more than 5 acres. Although individually, sites smaller than 5 acres of disturbance are anticipated to have less adverse habitat impacts compared to individual larger disturbances, multiple small disturbances collectively can have greater adverse impacts compared to isolated larger disturbances.

Alternative A designates the existing Jackson Canyon ACEC for bald eagles, but does not provide any additional special designations anticipated to benefit wildlife. Based on the challenges and existing conditions, the impacts described under Impacts Common to All Alternatives, and the management actions and allowable uses described for Alternative A, impacts to populations in all 11 statutory wildlife categories are expected to continue.

Big Game

The WGFD (2005b) identifies one or more of the following management challenges currently facing pronghorn, deer, elk, and bighorn sheep herd units in the planning area: habitat loss and fragmentation due to development, roads, trails, fences, agricultural conversion, and competition from livestock; poor public access for hunting; drought; conifer encroachment; increasing OHV use violations; human disturbance; spread of INPS; urbanization; poor nutrient value in shrubs; degradation, lack of regeneration, or high mortality in aspen and limber pine stands; and poor conditions and lack of understory in some riparian areas (see Appendix E). Although the BLM authorized officer may, under the existing plan, approve exceptions, waivers, or modifications, no surface development is allowed annually from November 15 through April 30 on all big game crucial winter ranges in the planning area. Alternative A does not identify large contiguous blocks of intact native vegetation in the planning area for protection from habitat fragmentation. Moreover, Alternative A does not restrict wind-energy development. Alternative A manages aspen, mountain shrub, and grassland and shrubland, habitat in the planning area toward DFC on a case-by-case basis and manages riparian and wetland habitat in the planning area towards PFC on a case-by-case basis. In addition, Alternative A maintains the current acreage of surface water in the planning area and does not identify specific actions to reduce salt cedar or other INPS that may adversely impact big game habitat. The management actions for Alternative A are generally expected to maintain existing conditions for big game in the planning area.

Trophy Game

Trophy game in the planning area include black bears and mountain lions. Black bear baiting around developed recreational areas is a management challenge for the BLM. Although bear baiting is regulated

by the WGFD, baiting near recreational areas can result in conflicts between humans and bears. Under Alternative A, the BLM prohibits bear baiting within ½ mile of developments in the Muddy Mountain EEA. Black bears are affected by management actions in forest and woodland habitats, which, generally, are not focused on providing habitats for black bears or mountain lions.

Mountain lions generally utilize similar habitats as mule deer—their primary prey. Russell (1980) indicates that the mountain lion's adaptability and wide distribution precludes designating much habitat as critical for this species; however, human encroachment into habitat supporting mountain lions and their prey reduce opportunities to manage this species. Although no specific management actions for mountain lions in the alternatives exist, mountain lions are impacted by management actions for mule deer and big game habitats.

Furbearing Animals

Furbearing animals include badger, beaver, bobcat, marten, mink, muskrat, and weasel. No specific management actions for furbearing animals exist, but these species are impacted by other management actions. Indeed, Storm and Tzilkowski (1982) indicate that land use and habitat markedly influence populations of furbearing animals. Badger, bobcat, and weasel are habitat generalists and, therefore, are impacted by actions in a variety of habitats. Impacts to various vegetation types can be found throughout this section.

The American marten is found in the planning area's forests and woodlands. American martens generally prefer older coniferous forest stands and aspen. Under Alternative A, no specific management actions aimed at maintaining late-successional forests and woodlands to benefit wildlife exist. Alternative A implements actions toward achieving DFC in aspen and woodlands on a case-by-case basis.

Beaver, muskrat, and mink also can be found in association with aspen, but are always near wetland and riparian areas. Under Alternative A, the BLM manages toward PFC on lotic and adjacent riparian habitat and lentic habitat. An estimated 1,500 acres of water sources beneficial to riparian and wetland species currently exist in the planning area. Under Alternative A, the BLM pursues new water sources opportunistically. Livestock and wildlife tend to congregate at water sources, resulting in damage to critical riparian habitats. Under Alternative A, fencing of streams on BLM-administered land is evaluated on a case-by-case basis.

Predatory Animals

Predatory animals in the planning area include coyote, jackrabbit, porcupine, feral cat, red fox, raccoon, striped skunk, and spotted skunk. The BLM does not conduct any specific habitat management activities for predatory animals. Regardless, predatory animals will be affected by BLM management actions for wildlife habitats. These animals are largely habitat generalists and, therefore, would be impacted by actions for a variety of habitat types. Impacts to various vegetation types can be found throughout this section.

Small Game

Small game includes the cottontail rabbit, snowshoe hare, red squirrel, fox squirrel, and gray squirrel. No specific management actions for small game exist under Alternative A, but these species would be impacted by other biological resource management actions. Habitat fragmentation is an issue for small game populations because their populations tend to be especially disadvantaged by isolation (Temple 1985). Cottontail rabbits are habitat generalists and would be impacted by a variety of actions in all habitat types. Snowshoe hare and red squirrel inhabit forests and woodlands. Impacts to these habitats are discussed under Nongame (Neotropical Migrants). Fox squirrel and gray squirrel occur in riparian forests. Impacts to riparian areas are also discussed under Nongame (Neotropical Migrants).

Game Birds

BLM (1992e) identifies modifying grazing, prescribed burning, installing water developments, and building roost structures as methods for improving habitat for upland game birds. Sharp-tailed grouse, as well as Hungarian partridge and chukar, inhabit grasslands on the planning area and, therefore, would be impacted by management actions in grassland habitats. Under Alternative A, there are no specific management actions for game birds that utilize grasslands. These species would be impacted by actions in grassland habitat, such as surface-disturbing activities, reclamation, INPS control, and livestock and wildlife grazing.

To minimize impacts to sharp-tailed grouse under Alternative A, surface disturbance or occupancy would be avoided within ¼ mile of occupied leks. Within this buffer, a TLS restriction would apply between 8 p.m. and 8 a.m. from March 1 to May 15 to minimize human disturbance. To protect associated nesting and early brood-rearing habitats, surface disturbance is avoided within 2 miles of leks from March 15 to July 15. Additional identified nesting and early brood-rearing habitats outside this 2-mile buffer also is protected. TNC (2000) indicates that populations of sharp-tailed grouse respond favorably to increases or protection of food sources and habitats (i.e., nesting and winter). Moreover, TNC (2000) suggests that at the proper frequency and scale, fire can be used to improve habitats for sharp-tailed grouse.

Other game birds are impacted by management actions in their preferred vegetation types. Ring-necked pheasants generally need undisturbed grass and weedy vegetation (BLM 1992e). This species occurs primarily on private lands in the planning area and likely would not be affected by BLM actions. Blue grouse inhabit forested areas and grass or sagebrush habitats and, therefore, are affected by management actions in these habitats; impacts to these habitats are discussed under Nongame (Neotropical Migrants). Wild turkeys use a variety of habitats, including river bottoms, pine forests, and foothills habitats. Impacts to these habitats are discussed under Nongame (Neotropical Migrants).

Migratory Game Birds

Although there are no specific management actions for migratory game birds (waterfowl), these species are impacted by other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats. Under Alternative A, the BLM manages toward PFC for lotic and adjacent riparian habitats and lentic habitats. An estimated 1,500 acres of water sources beneficial to waterfowl currently exist in the planning area. Under Alternative A, the BLM pursues new water sources opportunistically.

Nongame (Raptors)

BLM (1992b) identifies declining habitat quantity and quality as the major causes of decreases in raptor populations. In the planning area, disturbance impacts to raptors are minimized by buffer zones around raptor nests. Under Alternative A, the BLM determines the sizes of buffer zones around raptor nests on a case-by-case basis from February 1 through July 31; buffer zones typically are ¼- to ½-mile wide. Including special status raptor nests, Alternative A protects 82,938 acres to 123,622 acres surrounding raptor nests. Protective buffers help to minimize, but cannot completely prevent, impacts to raptors because most species are highly mobile well beyond any buffers. Parrish et al. (1994) summarizes field-tested mitigation techniques to reduce impacts to raptors.

Wind-energy facilities can be a source of mortality for raptors because raptors can collide with wind tower blades. High mortality could result if wind towers are placed along a migration path or within nesting territories. Wind-energy facilities also result in habitat loss and human disturbance through construction and maintenance of wind towers and associated facilities. Alternative A allows for the development of wind-energy facilities throughout the planning area.

Nongame (Neotropical Migrants)

BLM (1992b) states that viable nongame bird populations and biological diversity can be promoted by improving livestock management, prescribed burning, removal of INPS, seeding, and erosion control. These actions are managed under Alternative A; however, prescribed burning is limited and the spread of INPS is expected to continue under Alternative A.

All neotropical migrants could be adversely impacted by wind-energy facilities, as discussed for nongame raptors. Wind-energy facilities, as well as other linear features (e.g., roads, utility corridors), fragment habitat. Paton (1994) indicates that the success of nongame bird nests declines near habitat edges.

Because of the diversity of bird species and habitat requirements, the descriptions of impacts are categorized under the following habitat guilds (note: a guild is a group of species that tend to occur in similar types of habitats): Forest and Woodland Species, Mountain Shrub Species, Sagebrush and Desert Shrub Species, Grassland Species, and Riparian and Wetland Species.

Forest and Woodland Species – No specific management actions exist under Alternative A to manage forests for wildlife. BLM actions for silviculture treatments, forest products, and insect control result in short-term disturbance. Clear-cuts that have not naturally regenerated within 3 years are artificially regenerated, thereby maintaining long-term sustainability. In aspen and other woodland communities, the BLM implements actions to achieve DFC on a case-by-case basis. Because of their diverse habitat requirements, some neotropical migrants are adversely impacted and some benefit from these management actions.

Mountain Shrub Species – Under Alternative A, the BLM manages mountain shrub communities for DFC on a case-by-case basis. Management for DFC is anticipated to maintain existing conditions for neotropical migrants dependent on mountain shrub habitat.

Sagebrush and Desert Shrub Species – Species that utilize or depend on sagebrush habitat benefit from management actions for greater sage-grouse as discussed in the Special Status Species – Wildlife section. Alternative A manages buffers around greater sage-grouse leks and nesting or early brood-rearing habitats. Because the breeding season of greater sage-grouse and neotropical migrants coincide, many species of neotropical migrants benefit from this restriction.

Under Alternative A, the BLM manages sagebrush habitat and implements actions to achieve desired future conditions on a case-by-case basis. Management actions in sagebrush habitats could impact habitats for many neotropical migrants. Such actions include surface-disturbing activities, reclamation, control of INPS, and livestock and wildlife grazing. Surface-disturbing activities can result in habitat loss and fragmentation and reduce habitat quality. Alternative A does not provide specific guidance or management actions for the prevention of habitat fragmentation. Reclamation from surface disturbance and spread of INPS is handled on a case-by-case basis. Under Alternative A, the BLM continues to monitor rangeland health and prevent overutilization by livestock, with an emphasis on higher priority allotments (i.e., I and M allotments, see Glossary).

Grassland Species – Under Alternative A, there are no specific management actions for neotropical migrants that utilize grasslands. These species would be impacted by actions in grassland habitat, such as surface-disturbing activities, reclamation, INPS control, and livestock and wildlife grazing. Under Alternative A, grassland habitat could be impacted by long-term surface disturbance on BLM-administered land in the planning area.

Riparian and Wetland Species – Although there are no specific management actions for neotropical migrants that use riparian and wetlands, these species are impacted by other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats. Under Alternative A, the BLM manages toward PFC on lotic and adjacent riparian habitat and lentic habitat. An estimated 1,500 acres of water sources beneficial to riparian and wetland species currently exist in the planning area. Under Alternative A, the BLM pursues new water sources opportunistically. Livestock and wildlife tend to congregate at water sources, resulting in damage to critical riparian habitats. Under Alternative A, fencing of streams on BLM-administered land is evaluated on a case-by-case basis.

Salt cedar, an exotic riparian shrub, has invaded 1,700 acres of BLM-administered land in the planning area. No specific management for the eradication of salt cedar and no comprehensive management plan for controlling INPS exist under Alternative A.

Nongame (Mammals)

Although there are no specific management actions for nongame mammals, these species would be impacted by other biological resource management actions. Nongame mammals are found in a variety of habitats and are affected by management actions in the preferred vegetation type of each species. Impacts to the various vegetation types are described above for nongame neotropical migrants and are expected to similarly impact nongame mammals.

Although bats also can utilize a variety of habitats, caves and abandoned mines are important features for most species. Bats that use caves for roosting, maternity colonies, or hibernation could be affected by surface-disturbing activities near caves, cliffs, or other rock features. Abandoned mine closure and recreational caving have been identified as the two major threats to bat habitats (Priday and Luce 1995). Priday and Luce (1999) refer to caves and abandoned mines as “crucial habitat” for some species of bats. As with other species in the planning area, water in close proximity to other habitat features is important to bats, especially maternity colonies (Priday and Luce 1995).

Nine thousand six hundred sixty three acres of identified “rock outcrops/badlands” on BLM-administered land could contain potential bat habitats. These areas are steep to very steep. Under Alternative A, the BLM restricts surface-disturbing activities on slopes greater than 25 percent on a case-by-case basis. No specific management actions for abandoned mines exist under Alternative A. All bats could be adversely impacted by wind-energy facilities, as discussed for raptors.

Nongame (Reptiles and Amphibians)

Although there are no specific management actions for reptiles and amphibians under Alternative A, these species are impacted by other biological resource management actions. Snakes occur in a variety of habitat types, while lizards typically occur in the drier habitats, particularly those with rock outcrops and cliffs. Aquatic turtles and amphibians require riparian and wetland habitats. The impacts of management actions on these habitat types are discussed throughout this section.

Anticipated impacts are the result of increasing demand for resources in the planning area; lack of proactive management actions to minimize habitat fragmentation; lack of a comprehensive management plan to control the spread INPS; amount of land predicted to be disturbed by OHV use and surface-disturbing activities; lack of forest management focus on providing for wildlife habitats; and current management of wildland fire, prescribed fire, and fire suppression. Alternative A is anticipated to adversely and beneficially impact 10 of the 11 wildlife categories over the long term. Big game is the only category anticipated to not be beneficially impacted in some manner over the long term.

Alternative B

Potential impacts to statutory wildlife categories are described in this section in relation to the intensity of allowable uses and management actions comprising Alternative B and in the context of the types of impacts described in Impacts Common to All Alternatives. Potential impacts to statutory wildlife categories from Alternative B are described relative to Alternative A.

Surface-disturbing Activities. Alternative B includes more restrictions regarding surface disturbance than Alternative A. For example, Alternative B does not allow surface occupancy (NSO) on highly erosive soils or surface disturbance on slopes greater than 25 percent. Alternative B also requires temporary protective surface treatment on disturbed areas. Moreover, Alternative B has the least BLM-administered surface with high potential for water erosion and the least BLM-administered surface with high potential for wind erosion subject to no, or only minor, restrictions on surface activities. The additional restrictions on surface disturbance are anticipated to benefit wildlife habitat.

Once surface disturbance occurs, reclamation requirements under Alternative B are anticipated to reduce adverse impacts to wildlife habitat. Alternative B closes and reclaims all existing roads and trails on BLM-administered surface not being utilized to meet public demand. The closure of roads and trails is anticipated to benefit wildlife habitats by reducing habitat fragmentation and erosion and pollutant runoff stemming from such roads and trails. OHV use under Alternative B is more restricted and, therefore, more beneficial to wildlife habitats. OHV use in the planning area under Alternative B is managed by four designations, as shown in Table 4-9. Overall, the tactical constraints, fuel management approach, rehabilitation, and use of prescribed fire under Alternative B is anticipated to benefit wildlife habitats.

Wildlife-disturbing Activities. Alternative B allows natural ignitions within areas with wildland fire use plans to proceed to meet desired management objectives. Moreover, Alternative B focuses wildland fire use plans within aspen, juniper, and true mountain mahogany communities, which are anticipated to benefit wildlife.

Seventeen hundred acres of salt cedar are treated under Alternative B. In addition, Alternative B develops and implements a comprehensive management plan for controlling the spread INPS in the planning area. Part of this plan would be to hold livestock for 72 hours prior to movement on or within public lands to control the spread of INPS on BLM-administered lands. The plan and specific actions to control INPS identified for Alternative B are anticipated to slow the spread of INPS within the planning area and, thereby, benefit wildlife habitats.

Proactive Management Actions. Proactive management actions under Alternative B are anticipated to benefit wildlife because of management toward DPC under Alternative B rather than management toward PFC or DFC under Alternative A. Forest management under Alternative B benefits wildlife habitat. For example, Alternative B manages forestlands specifically for watershed stability and wildlife habitats and maximizes opportunities to promote species diversity, species vitality, and genetic diversity. Alternative B also treats woodland encroachment in grassland, sagebrush, aspen, and other vegetative communities where it is determined to be detrimental to other resource values and uses, benefiting grassland, sagebrush, and shrubland wildlife species. Alternative B benefits aquatic habitat due to the construction of an additional 1,000 acres of surface water in the planning area.

No exceptions are granted to the restriction for big game crucial winter range under Alternative B; therefore, the benefits to big game and other wildlife under Alternative B are anticipated to be greater in these areas. In addition, Alternative B proposes a proactive management action to avoid or minimize the adverse impacts from habitat fragmentation. The protected contiguous blocks of land would prohibit wind-energy development, and Alternative B limits wind-energy development to the smallest area (power

classes 6 and 7; refer to Chapter 3, Table 3-26, for a description of these classes) of all alternatives. Minimizing the adverse impacts of habitat fragmentation is anticipated to benefit all wildlife categories described in this section.

Alternative B provides more protection to surface water from potential impacts associated with soil erosion and runoff from disturbed areas and other actions. For example, Alternative B institutes a CSU restriction within ¼ mile of perennial streams, riparian and wetland habitats, and water bodies (lakes and ponds). Alternative B also requires the fencing of all existing wells and reservoirs to exclude livestock or wildlife to avoid the degradation of these water sources. Alternative B also rehabilitates or redevelops all BLM-authorized well and spring developments, regardless if issues arise (as with Alternative A), thereby benefiting water sources and associated wildlife habitat. These restrictions are anticipated to benefit water quality and wetland and riparian areas.

Alternative B also protects or enhances riparian, wetland, and streamside habitats. For example, Alternative B, as necessary, uses fencing, development of alternative water sources, livestock herding, placement of supplements, adjustments to pasture boundaries, and adjustments to season of use to protect riparian, wetland, and streamside habitats. Management of runoff from roads and other impervious surfaces or disturbed areas is accomplished under Alternative B through an SWMP for all new BLM actions, regardless of area. This requirement under Alternative B is more restrictive than Alternative A and anticipated to benefit water quality and associated wildlife habitats.

The designation of SMAs and ACECs for special status and wildlife species are anticipated to add restrictions on resource use and uses in these areas, thereby limiting human-disrupting activities and associated habitat loss, degradation, and fragmentation. Overall, the designations under Alternative B are anticipated to benefit wildlife.

Alternative B maintains the existing Jackson Canyon ACEC for bald eagles, but also proposes to add two SMAs and the most ACECs of any alternative. For example, Alternative B establishes the Bates Hole SMA to benefit greater sage-grouse and watershed values. The benefit of establishing the Bates Holes SMA is anticipated to extend to other sagebrush and grassland species beyond the greater sage-grouse. Alternative B also designates an ACEC for black-tailed prairie dogs that would benefit other grassland wildlife species as well. Alternative B would designate the North Platte River ACEC and the South Bighorns/Red Wall ACEC, both of which are anticipated to benefit wildlife habitats.

Big Game

Alternative B reduces habitat loss and fragmentation due to restrictions on development that lessen the amount of disturbed surface and protect large contiguous blocks of land from fragmentation. Moreover, Alternative B restricts wind-energy development, OHV use, and livestock grazing in favor of wildlife habitat. Alternative B also utilizes forest management and fire management as tools to benefit wildlife habitats. The addition of more surface water acres and the greater protection of existing water sources also are anticipated to enhance wildlife habitats to a greater extent under Alternative B. Alternative B restores and protects important riparian and wetland habitat and manages the most acreage of different vegetation types (e.g., sagebrush, aspen, etc.) deemed important to wildlife toward DPC compared to all alternatives. Alternative B also more effectively controls the spread of INPS.

Trophy Game

Alternative B prohibits bear baiting within 1 mile of all BLM recreational developments in the planning area. Relative to Alternative A, this restriction minimizes the potential conflicts between people and bears. Black bears also are affected by management actions in forest and woodland habitats.

Mountain lions generally utilize similar habitats as mule deer—their primary prey. Although there are no specific management actions for mountain lions in the alternatives, mountain lions are impacted by management actions for mule deer and big game habitats.

Furbearing Animals

Alternative B actions to promote old-growth characteristics benefit the American marten. For example, Alternative B manages ponderosa pine stands for old growth (including snags) in Little Red Creek, Esterbrook, and Jackson Canyon. Moreover, Alternative B places increased importance on the value of aspen communities by managing toward DPC.

Alternative B actions to manage toward DPC on lotic and adjacent riparian habitat and lentic habitat benefit riparian and wetland species, such as the beaver. Moreover, the addition of 1,000 acres of surface water under Alternative B is anticipated to increase the amount of habitat for beaver, muskrat, and mink. These species benefit by improved habitat and water quality and improved floodplain connectivity and function anticipated under Alternative B.

Alternative B actions protect and enhance riparian and wetland habitats by more restrictive management of livestock in these areas. Management actions include fencing, developing alternative water supplies for livestock, herding, placing feed and mineral supplements away from water sources, and making adjustments to pasture boundaries and season of use. These actions are anticipated to ultimately result in riparian systems with increased vegetation and structural diversity throughout the planning area, with benefits for beaver, muskrat, mink, and other riparian and wetland species.

Predatory Animals

Alternative B actions benefiting different vegetative types in the planning area are anticipated to benefit habitat generalists, such as predatory animals.

Small Game

Alternative B actions benefiting forests, woodlands, riparian areas, and other habitat types are anticipated to benefit the habitat generalist cottontail rabbit, as well as more habitat-specific species, such as the snowshoe hare, red squirrel, fox squirrel, and gray squirrel.

Game Birds

The sharp-tailed grouse is the only game bird (except for the greater sage-grouse discussed in the Special Status Species – Wildlife section) with specific management actions. Sharp-tailed grouse buffer zones increase under Alternative B. Sharp-tailed grouse, as well as Hungarian partridge and chukar, inhabit grasslands on the planning area and are anticipated to benefit from actions conserving this vegetative type. Ring-necked pheasants, blue grouse, and wild turkey are also anticipated to benefit from Alternative B actions, which conserve other habitat types.

Migratory Game Birds

Alternative B actions pertaining to water and riparian and wetland habitats are anticipated to benefit migratory game birds. Under Alternative B, the BLM manages toward DPC on lotic and adjacent riparian habitat and lentic habitat, constructs 1,000 acres of water reservoirs, improves floodplain connectivity and function on 350 miles of stream, and restores 108 miles of incised streams and 90 acres of lentic habitat.

Nongame (Raptors)

Restrictions around raptor nests are more extensive under Alternative B, since seasonal restrictions are not exempted and all buffers are ½ mile, resulting in fewer direct impacts to nesting raptors. In addition, Alternative B limits wind-energy development to outstanding/superb power classes, thereby limiting potential collisions and electrocution of raptors. Currently, 21 raptor nests and 4 bald eagle roosts occur on BLM-administered land rated as outstanding/superb. Alternative B also manages sagebrush, aspen, and other vegetative types toward DPC, restores and protects riparian areas, restricts livestock grazing, and increases control of INPS. These actions are anticipated to benefit birds and small mammals comprising raptor prey in the planning area.

Nongame (Neotropical Migrants)

Alternative B actions pertaining to forest management; management of sagebrush, aspen, mountain shrub, lotic, and lentic habitats toward DPC; INPS control; habitat fragmentation; creation and protection of water sources; and fire management are anticipated to benefit nongame neotropical migrants in the planning area.

Forest and Woodland Species – There are specific management actions in Alternative B aimed at managing forests and woodlands to benefit wildlife. Alternative B promotes forest management that emphasizes forest diversity, which is anticipated to support an abundance and diversity of neotropical migrants. Alternative B actions that manage ponderosa pine stands for old growth (including snags) in Little Red Creek, Esterbrook, and Jackson Canyon also are anticipated to benefit other wildlife. Alternative B limits clear-cuts to 5 acres with meandering boundaries, which would minimize impacts of habitat fragmentation for some species. Alternative B places increased importance on the value of aspen communities by managing for DPC.

Mountain Shrub Species – Under Alternative B, the BLM places an increased importance on mountain shrub communities by managing mountain shrub communities for DPC.

Sagebrush and Desert Shrub Species – Species that utilize or depend on sagebrush habitats would benefit from management actions for greater sage-grouse, as described in the Special Status Species – Wildlife section. Because the breeding season of greater sage-grouse and neotropical migrants coincide, many species of neotropical migrants would benefit from these restrictions. Alternative B protects larger buffers around greater sage-grouse leks and nesting or early brood-rearing habitats, thereby benefiting sagebrush and desert shrub neotropical migrants.

Alternative B provides more restrictions to minimize habitat loss and fragmentation in all habitat types, including sagebrush and desert shrubs. The area disturbed would be smaller and reclamation of disturbed areas would be faster (one growing season); thereby, maintaining long-term habitat quality in all habitat types, including sagebrush. Alternative B seeks to minimize adverse impacts to sagebrush and other habitats from the spread of INPS by implementing a comprehensive weed management plan. Furthermore, Alternative B monitors all allotments for rangeland health and limits forage utilization to 40 percent of the current year's growth. Alternative B also limits wind-energy development and habitat fragmentation to a greater extent compared to all other alternatives, thereby protecting more sagebrush habitat.

Grassland Species – Under Alternative B, grassland species benefit by less surface-disturbing activities, more reclamation requirements, more INPS control, and less livestock grazing in grassland habitats. In addition, Alternative B actions limiting habitat fragmentation are anticipated to benefit grassland neotropical migrants.

Riparian and Wetland Species – Alternative B actions that protect, enhance, and restore water and riparian and wetland habitats are anticipated to benefit neotropical migrants using riparian areas and wetlands. For example, Alternative B manages toward DPC on lotic and adjacent riparian habitat and lentic habitat; develops an additional 1,000 acres of surface water, which is expected to increase habitat for neotropical migrants; protects water sources from water quality degradation; improves floodplain connectivity and function on 350 miles of stream; and restores 108 miles of incised streams and 90 acres of lentic habitat.

Alternative B treats 1,700 acres of salt cedar in the planning area, thereby minimizing the adverse impact of INPS on riparian habitat diversity. Treatment of salt cedar results in improved breeding and migratory habitat for neotropical migrants. The proposed comprehensive management plan for INPS under Alternative B is anticipated to improve riparian and wetland habitats.

Alternative B protects and enhances riparian and wetland management by restricting livestock grazing in these areas through the use of fencing, developing alternative water supplies for livestock, herding, placing feed and mineral supplements away from water sources, and making adjustments to pasture boundaries and season of use. These actions are anticipated to ultimately result in a riparian system with increased vegetation and structural diversity, leading to an increase in abundance and diversity of neotropical migrants.

Nongame (Mammals)

Although there are no specific management actions for nongame mammals, these species are impacted by other biological resource management actions. Nongame mammals are found in a variety of habitats and are impacted by management actions in the preferred vegetation type of each species. Impacts to the various vegetation types are discussed above for nongame neotropical migrants and are expected to similarly impact nongame mammals.

Approximately 9,663 acres of identified “rock outcrops/badlands” on BLM-administered land could contain bat habitats. These areas include steep terrain. Alternative B prohibits surface-disturbing activities on slopes greater than 25 percent, which is anticipated to benefit bat species. All bats could be adversely impacted by wind-energy facilities. Because Alternative B limits wind-energy development, adverse impacts to bats from wind energy are anticipated to be less than under Alternative A.

Nongame (Reptiles and Amphibians)

Although there are no specific management actions for reptiles and amphibians, these species are impacted by other biological resource management actions under Alternative B. The impacts of management actions on these habitat types are discussed throughout this section.

Based on all the factors described and the current challenges within the planning area, Alternative B is anticipated to have the most beneficial and the least adverse impacts to all 11 wildlife categories in the planning area.

Alternative C

Potential impacts to wildlife categories are described in this section in relation to the intensity of allowable uses and management actions comprising Alternative C and in the context of the types of impacts described in the Impacts Common to All Alternatives section. Potential impacts to wildlife categories from Alternative C are described relative to Alternative A.

Surface-disturbing Activities. Alternative C includes more restrictions regarding surface disturbance, but less compared to Alternative B. For example, Alternative C allows, but minimizes, surface

occupancy (NSO) on highly erosive soils and prohibits surface disturbance on slopes greater than 25 percent on highly erosive soils. Alternative C also requires temporary protective surface treatment on disturbed areas. Moreover, Alternative C has less BLM-administered surface with a high potential for water erosion and less BLM-administered surface with a high potential for wind erosion subject to no or only minor restrictions on surface activities. Whereas Alternative A restricts use of heavy equipment to construct fire lines in elk crucial winter range, Alternative C prohibits use of heavy equipment in all big game crucial winter range, except where human safety is at risk. Alternative C also differs from Alternative A in that the former does not identify any full suppression areas. Alternative C rehabilitates all suppression related damage compared to the case-by-case approach of Alternative A and includes use of chemicals to control INPS when present. Alternative C also uses an integrated management approach to reduce fuels to protect high priority areas or resources including, but not limited to, sensitive wildlife habitats. Overall, the tactical constraints, fuel management approach, rehabilitation, and use of prescribed fire under Alternative C are anticipated to benefit wildlife habitats.

Once surface disturbance occurs, reclamation requirements under Alternative C are anticipated to reduce adverse impacts to wildlife habitats. For example, Alternative C requires reclamation to be completed in three growing seasons. In addition, Alternative C requires salvage and segregation of topsoil or alternative soil-handling methods, use of native species of vegetation, and use of certified weed-free seed for reclaiming disturbed areas.

Alternative C closes and reclaims all existing roads and trails on BLM-administered surface in areas designated as highly erosive soils and not being utilized to meet public demand. The closure of roads and trails is anticipated to benefit wildlife habitats by reducing habitat fragmentation and erosion and pollutant runoff coming from roads and trails. In addition, OHV use under Alternative C is more restricted and, therefore, more beneficial to wildlife habitat.

Wildlife-disturbing Activities. Use of prescribed fire under Alternative C is anticipated to benefit wildlife habitats. For example, Alternative C uses prescribed burning to achieve measurable landscape level objectives for wildlife and other resource programs, reduce hazardous fuels, and reintroduce fire into fire-adapted ecosystems in the planning area. Alternative C develops wildland fire use plans; however, Alternative C also allows natural ignitions within areas with wildland fire use plans to meet desired management objectives. Moreover, Alternative C focuses wildland fire use plans within aspen, juniper, and true mountain mahogany communities, which are anticipated to benefit wildlife.

Salt cedar is treated under Alternative C. In addition, Alternative C develops and implements a comprehensive management plan for controlling INPS in the planning area. Part of this plan could require holding livestock for 72 hours prior to movement on or within public lands to control the spread of INPS on BLM-administered lands. The plan and specific actions to control INPS identified for Alternative C are anticipated to slow the spread of INPS within the planning area.

Proactive Management Actions. Proactive management actions under Alternative C are anticipated to benefit wildlife because of management toward DPC under Alternative C compared to management toward PFC or DFC. Forest management under Alternative C achieves a sustainable flow of wood products; however, Alternative C identifies snags to be left for wildlife. Alternative C also treats woodland encroachment in grassland, sagebrush, aspen, and other vegetative communities, where it is determined to be detrimental to other resource values and uses. Treating encroachment of woodland species could benefit grassland, sagebrush, and shrubland wildlife species. Alternative C constructs an additional 500 acres of surface water in the planning area, resulting in more beneficial impacts to aquatic habitats compared to Alternative A.

Exceptions to the big game crucial winter range seasonal restriction could be granted by BLM under Alternative C; however, a wildlife mitigation plan would be required under Alternative C, thereby providing additional protection to big game habitat.

Alternative C proposes a proactive management action to avoid or minimize the adverse impacts from habitat fragmentation. Alternative C protects the second most (behind Alternative B) habitat of any alternative from fragmentation. The protected contiguous blocks of land also prohibit wind-energy development and Alternative C limits wind-energy development to power classes 4 through 7 (see Table 3-26). Minimizing the adverse impacts of habitat fragmentation is anticipated to benefit all statutory wildlife categories described in this section.

Alternative C provides more protection to surface water from potential impacts associated with soil erosion and runoff from disturbed areas and from other actions. For example, Alternative C institutes a CSU restriction as described for Alternative B, except this restriction would be applied only to Class 1 streams (refer to Glossary). Alternative C also requires fencing all existing wells and reservoirs constructed after 1995 to exclude livestock or wildlife, thereby avoiding degradation of these water sources. Alternative C also rehabilitates or redevelops all BLM-authorized well and spring developments producing 10 or more gallons per minute, regardless of whether issues arise (as with Alternative A), thereby benefiting water sources and associated wildlife habitats. These restrictions under Alternative C are anticipated to benefit water quality and wetland and riparian areas.

Alternative C also protects or enhances riparian, wetland, and streamside habitats. For example, Alternative C would, as necessary, use fencing, develop alternative water sources, manage livestock, place supplements, and adjust pasture boundaries and season of use to protect streams that are nonfunctional or functional at-risk. Management of runoff from roads and other impervious surfaces or disturbed areas is accomplished under Alternative C through requirement of an SWMP for all new BLM actions impacting more than 1 acre. This requirement is more restrictive and is anticipated to benefit water quality and associated wildlife habitats.

The designation of SMAs and ACECs for special status and wildlife species are anticipated to add restrictions on resource use and uses in these areas, thereby limiting human-disrupting activities and associated habitat loss, degradation, and fragmentation. Overall, the designations under Alternative C are anticipated to benefit wildlife.

Alternative C maintains the existing Jackson Canyon ACEC for bald eagles, but also proposes to establish the Bates Hole SMA to benefit greater sage-grouse and watershed values. The benefit of the Bates Holes SMA is anticipated to extend to other sagebrush and grassland species beyond the greater sage-grouse. Alternative C designates an ACEC for black-tailed prairie dogs that benefits other grassland wildlife species as well. Alternative C also designates the North Platte River ACEC and establishes the South Bighorns/Red Wall SMA, both of which are anticipated to benefit wildlife habitat.

Big Game

Alternative C requires development of a wildlife mitigation plan for all development occurring in the big game crucial winter range. This requirement benefits big game more compared to Alternative A. Alternative C also restricts wind-energy development and OHV use in favor of wildlife habitat. The addition of more surface water acres and the greater protection of existing water sources are also anticipated to enhance wildlife habitat to a greater extent under Alternative C. Alternative C restores and protects important riparian and wetland habitats and manages different vegetation types (e.g., sagebrush, aspen, etc.) deemed important to wildlife toward DPC compared to management toward DFC. Alternative C also more effectively controls INPS.

Trophy Game

Alternative C prohibits bear baiting within ½ mile of all BLM recreational developments in the planning area. This restriction minimizes potential conflict between humans and bears. Black bears also are affected by management actions in forest and woodland habitats.

Mountain lions generally utilize similar habitats as mule deer—their primary prey. Although there are no specific management actions for mountain lions in the alternatives, mountain lions are impacted by management actions for mule deer and big game habitats.

Furbearing Animals

Alternative C does not include specific management actions aimed at maintaining late-successional forest and woodlands stands to benefit American marten; rather, the goal is to maintain sustainable flow of wood products. Selected wildlife snags are retained in Little Red Creek, Jackson Canyon, and Esterbrook. Alternative C places increased importance on the value of aspen communities by managing for DPC. Overall, Alternative C includes few management actions specifically benefiting the American marten.

Alternative C manages lotic and adjacent riparian habitats and lentic habitats toward DPC to the benefit of beaver, muskrat, and mink. Alternative C's action to develop an additional 500 acres of surface water increases habitat for beaver, muskrat, and mink. These species also benefit by improving habitat and water quality, including improved floodplain connectivity and function.

To minimize damage to critical riparian habitats, Alternative C protects and enhances riparian and wetland management by managing livestock in these areas. Management actions could include fencing, developing alternative water supplies for livestock, herding, placing feed and mineral supplements away from water sources, and adjusting pasture boundaries and season of use. These actions apply to streams only on BLM-administered lands rated as nonfunctional or functional at-risk; however, these actions are anticipated to ultimately result in riparian systems with improved vegetation and structural diversity throughout the planning area, leading to an increase in habitat for beaver, muskrat, mink, and other wetland and riparian species.

Predatory Animals

Alternative C actions benefiting different vegetative types in the planning area are anticipated to benefit habitat generalists, such as predatory animals.

Small Game

Alternative C actions benefiting forests, woodlands, riparian areas, and other habitat types utilized by small game are anticipated to benefit habitat generalists, such as the cottontail rabbit and more habitat specific species, such as the snowshoe hare, red squirrel, fox squirrel, and gray squirrel.

Game Birds

The sharp-tailed grouse is the only game bird (except for the greater sage-grouse, discussed in the Special Status Species – Wildlife section) with specific management actions. Sharp-tailed grouse buffer zones are the same under Alternative C, except the language would be changed from "avoid" to "prohibit." Sharp-tailed grouse, as well as Hungarian partridge and chukar, inhabit grasslands on the planning area and are anticipated to be impacted by actions affecting this vegetative type. Ring-necked pheasants, blue grouse, and wild turkey also are anticipated to be impacted by Alternative C actions, which also affect other habitat types.

Migratory Game Birds

Alternative C actions pertaining to water and riparian and wetland habitats are anticipated to benefit migratory game birds. Alternative C manages lotic and adjacent riparian habitats and lentic habitats toward DPC compared to PFC under Alternative A. Alternative C also constructs 500 acres of water reservoirs, improves floodplain connectivity and function, and restores incised streams and lentic habitats. Based on actions to manage habitat types toward DPC, increase INPS control, restore and protect riparian and wetland habitat, avoid habitat fragmentation, create new water reservoirs, and protect existing water sources, Alternative C is anticipated to be more beneficial and have less adverse impacts to migratory game birds compared to Alternative A.

Nongame (Raptors)

Alternative C restrictions around raptor nests are slightly more because all buffers will be ½-mile buffers. However, Alternative C limits wind-energy development, thereby limiting potential collisions and electrocution of raptors. One hundred sixty seven raptor nests and 3 bald eagle roosts currently occur on BLM-administered land rated as outstanding/superb and good/excellent. Without proper siting, Alternative C could adversely impact raptor species. Alternative C also manages sagebrush, aspen, and other vegetative types toward DPC, restores and protects riparian areas, restricts livestock grazing, and increases control of INPS. These actions are anticipated to benefit birds and small mammals comprising raptor prey in the planning area.

Nongame (Neotropical Migrants)

Alternative C actions pertaining to forest management; management of sagebrush, aspen, mountain shrub, lotic, and lentic habitats toward DPC; INPS control; habitat fragmentation; and creation and protection of water sources are anticipated to benefit nongame neotropical migrants in the planning area.

Forest and Woodland Species – Alternative C does not include specific management actions aimed at managing forests and woodlands to benefit wildlife; rather, the goal is to maintain a sustainable flow of wood products. Selected wildlife snags are retained in Little Red Creek, Jackson Canyon, and Esterbrook. Clear-cuts could be up to 20 acres in size, which could increase impacts of habitat fragmentation for forest-interior species. However, Alternative C places increased importance on the value of aspen communities by managing for DPC.

Mountain Shrub Species – BLM places an increased importance on mountain shrub communities under Alternative C by managing these communities for DPC compared to DFC.

Sagebrush and Desert Shrub Species – Species that utilize or depend on sagebrush habitats benefit from management actions for greater sage-grouse as discussed in the Special Status Species – Wildlife section. Because the breeding season of the greater sage-grouse and neotropical migrants coincide, many species of neotropical migrants benefit from buffers around greater sage-grouse leks and nesting and early brood-rearing habitats. Alternative C protects larger buffers around greater sage-grouse leks and the same-size buffers around nesting and early brood-rearing habitats, thereby benefiting sagebrush and desert shrub neotropical migrants.

Alternative C provides more restrictions to minimize habitat loss and fragmentation in all habitat types, including sagebrush and desert shrubs. The area disturbed is smaller and reclamation of disturbed areas is faster (three growing seasons) than Alternative A, thereby maintaining long-term habitat quality in all habitat types, including sagebrush. Alternative C seeks to minimize adverse impacts to sagebrush and other habitats from the spread of INPS by implementing a comprehensive weed-management plan. Alternative C focuses monitoring on category I and M grazing allotments for rangeland health and limit

forage utilization to 40 percent of the current year's growth. Alternative C also limits wind-energy development and habitat fragmentation to a greater extent, thereby protecting more sagebrush habitats.

Grassland Species – Under Alternative C, grassland species benefit from less surface-disturbing activities, more INPS control, and treatment of woodland encroachment into grassland habitats where it is detrimental to grassland species. In addition, Alternative C actions limiting habitat fragmentation are anticipated to more often benefit grassland neotropical migrants.

Riparian and Wetland Species – Alternative C actions protecting, enhancing, and restoring water and riparian and wetland habitats are anticipated to benefit neotropical migrants that use riparian and wetlands. For example, Alternative C manages lotic and adjacent riparian habitats and lentic habitats toward DPC compared to DFC. Alternative C also develops more (500) acres of surface water, which is expected to improve habitat for neotropical migrants. Alternative C also would improve more acres of floodplain connectivity and function; restore more incised stream miles; and restore more lentic habitat.

Alternative C treats more acres of salt cedar in the planning area, thereby minimizing the adverse impact of the spread of INPS on riparian habitat diversity. Treatment of salt cedar under Alternative C is anticipated to improve breeding and migratory habitats for neotropical migrants. The proposed comprehensive management plan for INPS under Alternative C also is anticipated to improve riparian and wetland habitats. To minimize impacts to riparian habitats, Alternative C protects and enhances riparian and wetland management by managing livestock in streams on BLM-administered lands rated as nonfunctional or functional at-risk. These actions are anticipated to ultimately result in riparian systems with improved vegetation and structural diversity throughout the planning area, leading to an increase in abundance and diversity of neotropical migrants.

Nongame (Mammals)

Approximately 9,663 acres of identified "rock outcrops/badlands" on BLM-administered land could contain bat habitats. These areas typically include steep terrain. Because Alternative C prohibits surface-disturbing activities on slopes greater than 25 percent in areas designated as highly erosive soils, benefits to bat species are anticipated. However, all bats could be adversely impacted by wind-energy facilities. Because Alternative C limits wind-energy development, adverse impacts to bats from wind energy under Alternative C are anticipated to be less than Alternative A.

Nongame (Reptiles and Amphibians)

Although there are no specific management actions for reptiles and amphibians, these species are impacted by other biological resource management actions under Alternative C. The impacts of management actions on these habitat types are discussed throughout this section.

Based on all the factors described and the current challenges within the planning area, Alternative C is anticipated to have more beneficial and less adverse impacts to all 11 wildlife categories in the planning area.

Alternative D

Potential impacts to statutory wildlife categories are described in this section in relation to the intensity of allowable uses and management actions comprising Alternative D and in the context of the types of impacts described in the Impacts Common to All Alternatives section. All potential impacts to wildlife categories from Alternative D are described relative to Alternative A.

Surface-disturbing Activities. Alternative D includes fewer restrictions regarding surface disturbance. For example, Alternative D allows surface-disturbing activities on highly erosive soils and on slopes

greater than 25 percent. Alternative D does not require use of temporary protective surface treatment on disturbed areas. Alternative D has the most BLM-administered surface with high potential for water erosion and the most BLM-administered surface with high potential for wind erosion subject to no or only minor restrictions on surface activities. This alternative uses full protection strategies throughout the planning area and rehabilitates suppression-related damage on a case-by-case approach; however, it includes use of chemicals to control INPS when present. Alternative D uses an integrated management approach to reduce fuels to protect high priority areas or resources including, but not limited to, sensitive wildlife habitats. However, Alternative D also suppresses all wildland fire in commercial forest stands. Overall, the fire management approach under Alternative D is anticipated to have more beneficial and less adverse impacts to wildlife habitats.

Once surface disturbance occurs, reclamation requirements under Alternative D are anticipated to produce similar impacts to wildlife habitats. For example, Alternative D requires reclamation be completed in five growing seasons; however, Alternative D does not require salvage and segregation of topsoil or alternative soil-handling methods, use of native species of vegetation, and use of certified weed-free seed for reclaiming disturbed areas. The fewer restrictions on surface disturbance under Alternative D are anticipated to adversely impact wildlife habitat.

OHV use under Alternative D would exhibit similar designations and, therefore, similar adverse impacts to wildlife habitats. Alternative D utilizes all existing roads and trails on BLM-administered surface, regardless of the level of public demand.

Wildlife-disturbing Activities. Use of prescribed fire under Alternative D is anticipated to benefit wildlife habitats. For example, Alternative D uses prescribed burning to achieve measurable landscape level objectives for wildlife and other resource programs, reduce hazardous fuels, and reintroduce fire into fire-adapted ecosystems in the planning area. Alternative D develops wildland fire use plans; however, it allows natural ignitions within areas with wildland fire use plans to proceed to meet desired management objectives. Moreover, Alternative D focuses wildland fire use plans within aspen, juniper, and true mountain mahogany communities, which are anticipated to benefit wildlife.

Eight hundred fifty acres of salt cedar are treated under Alternative D; however, Alternative D does not develop or implement a comprehensive management plan for controlling INPS in the planning area, nor does it require holding livestock for 72 hours prior to movement on or within public lands. Control of salt cedar is anticipated to slow the spread of this species within the planning area and thereby benefit riparian and wetland wildlife habitats. However, the lack of a comprehensive plan for controlling INPS is expected to continue the spread of INPS and degradation of other wildlife habitats in the planning area under Alternative D.

Proactive Management Actions. Proactive management actions under Alternative D are anticipated to benefit wildlife because of management toward DPC compared to management toward PFC or DFC. Forest management under Alternative D maximizes wood growth and flow of wood products, including maximizing harvest of wood products within bald eagle roost areas. Alternative D does not treat woodland encroachment in grassland, sagebrush, aspen, and other vegetative communities where determined to be detrimental to other resource values and uses. Not treating encroachment of woodland species could adversely impact grassland, sagebrush, and shrubland wildlife species. Aquatic habitat benefits more under Alternative D. For example, Alternative D constructs an additional 100 acres of surface water in the planning area.

Although exceptions area allowed, Alternative D prohibits surface development from November 15 through April 30 on all big game crucial winter ranges (see Map 23). Alternative D does not include a management action to avoid or minimize the adverse impacts from habitat fragmentation and, thus,

fragmentation is expected to be similar. Alternative D limits wind-energy development to wind power classes 4 through 7 (see Table 3-26), which is anticipated to reduce the potential for fragmentation from this type of development.

Alternative D provides more protection to surface water from potential impacts associated with soil erosion and runoff from disturbed areas and from other actions. For example, Alternative D would institute a CSU restriction similar to that described for Alternative B, except it would require an NSO restriction within 500 feet and a CSU restriction for the area beyond 500 feet and up to ¼ mile of perennial streams, riparian and wetland habitats, and water bodies. Alternative D requires fencing all new wells and new reservoirs constructed on BLM-administered lands to exclude livestock or wildlife to avoid the degradation of these water sources. Alternative D also rehabilitates or redevelops all BLM-authorized well and spring developments producing 20 or more gallons per minute, regardless of whether issues arise (as with Alternative A), thereby benefiting water sources and associated wildlife habitats more when compared to Alternative A. These restrictions are anticipated to benefit water quality and wetland and riparian areas.

Alternative D evaluates on a case-by-case basis the need for fencing streams on BLM-administered land. Management of runoff from roads and other impervious surfaces or disturbed areas is accomplished under Alternative D through an SWMP for all new BLM actions impacting more than 1 acre. This requirement is more restrictive and is anticipated to benefit water quality and associated wildlife.

Alternative D maintains the existing Jackson Canyon ACEC for bald eagles, but does not propose any additional designations for wildlife habitats. Alternative D does propose to establish two additional SMAs for oil and gas. Establishing oil and gas SMAs could adversely impact wildlife habitat through increased human disrupting activities and associated habitat loss, degradation, and fragmentation.

Big Game

Alternative D produces similar habitat loss and fragmentation from development. Alternative D restricts wind-energy development that could benefit some wildlife habitats; however, impacts from OHV use to wildlife habitats are expected to continue under Alternative D. The addition of more surface water acres may benefit more wildlife associated with aquatic habitats. Alternative D also restores and protects more important riparian and wetland habitats and manages different vegetation types (e.g., sagebrush, aspen, etc.) deemed important to wildlife toward DPC compared to management toward DFC.

Trophy Game

Alternative D prohibits bear baiting within ½ mile of all BLM recreational developments in the planning area. This restriction minimizes the potential for conflicts between humans and bears. Black bears also are impacted by management actions in forest and woodland habitats.

Mountain lions generally utilize similar habitats as mule deer—their primary prey. Although there are no specific management actions for mountain lions in the alternatives, mountain lions are impacted by management actions for mule deer and big game habitats.

Furbearing Animals

Alternative D does not include specific management actions aimed at maintaining older forests and woodland stands to benefit American marten; rather, the goal is to achieve maximum wood growth and flow of wood products. Alternative D places increased importance on the value of aspen communities by managing for DPC. Overall, forest management under Alternative D could adversely impact the American marten by maintaining younger and denser stands of trees.

Alternative D manages lotic and adjacent riparian and lentic habitats toward DPC to the benefit of beaver, muskrat, and mink. Alternative D's action to develop an additional 100 acres of surface water increases habitats for these types of wildlife and benefits them by improving floodplain connectivity and function. Livestock and wildlife tend to congregate at water sources, resulting in damage to critical riparian habitats. Fencing of streams on BLM-administered land is evaluated on a case-by-case basis under Alternative D.

Predatory Animals

Alternative D actions benefiting different vegetative types in the planning area are anticipated to benefit habitat generalists, such as predatory animals.

Small Game

Alternative D actions impacting forests, woodlands, riparian areas, and other habitat types utilized by small game are anticipated to benefit habitat generalists, such as the cottontail rabbit, and produce mixed results for more habitat-specific species, such as the snowshoe hare, red squirrel, fox squirrel, and gray squirrel.

Game Birds

The sharp-tailed grouse is the only game bird (except for the greater sage-grouse, discussed in the Special Status Species – Wildlife section) with specific management actions. Surface disturbance or occupancy is avoided within ¼ mile of sharp-tailed grouse leks under Alternative D. Buffer acreage protected for sharp-tailed grouse is the same under Alternative D. Sharp-tailed grouse, as well as Hungarian partridge and chukar, inhabit grasslands in the planning area and are anticipated to be impacted by actions affecting this vegetative type. Ring-necked pheasants, blue grouse, and wild turkey also are anticipated to be impacted by Alternative D actions, which impact other habitat types.

Migratory Game Birds

Alternative D actions pertaining to water and riparian and wetland habitats are anticipated to benefit migratory game birds. Alternative D manages lotic and adjacent riparian and lentic habitats toward DPC compared to PFC. Alternative D also constructs 100 acres of water reservoirs, improves floodplain connectivity and function, and restores incised streams and lentic habitats.

Nongame (Raptors)

Alternative D avoids surface disturbance within ½ mile of most raptor nests between February 15 and July 31; however, common or smaller species have ¼-mile buffers. Species with ¼-mile buffers include the red-tailed hawk, Swainson's hawk, American kestrel, osprey, great horned owl, long-eared owl, northern saw-whet owl, common barn owl, and western screech owl. Alternative D limits wind-energy development, thereby limiting potential collisions and electrocution of raptors. However, 461 raptor nests and 13 bald eagle roosts currently occur on BLM-administered land rated as outstanding/superb and fair/good/excellent. Without proper siting, Alternative D could adversely impact raptors. Alternative D also manages sagebrush, aspen, and other vegetative types to DPC and restores and protects riparian areas. These actions are anticipated to benefit birds and small mammals comprising raptor prey in the planning area.

Nongame (Neotropical Migrants)

Alternative D actions pertaining to forest management; management of sagebrush, aspen, mountain shrub, lotic, and lentic habitats toward DPC; INPS control; habitat fragmentation; and creation and protection of water sources are anticipated to impact nongame neotropical migrants in the planning area.

Forest and Woodland Species – Alternative D does not include specific management actions aimed at managing forests and woodlands to benefit wildlife; rather, the goal is to achieve maximum wood growth and flow of wood products. Alternative D places increased importance on the value of aspen communities by managing for DPC.

Mountain Shrub Species – The BLM places an increased importance on mountain shrub communities under Alternative D by managing these communities for DPC compared to DFC.

Sagebrush and Desert Shrub Species – Species that utilize or depend on sagebrush habitat benefit from management actions for greater sage-grouse as described in the Special Status Species – Wildlife section. Because the breeding season of greater sage-grouse and neotropical migrants coincide, many species of neotropical migrants benefit from buffers around greater sage-grouse leks and nesting and early brood-rearing habitats. Alternative D protects the same size buffers around greater sage-grouse leks and the same-size buffers around nesting and early brood-rearing habitats, thereby resulting in similar benefits to sagebrush and desert shrub neotropical migrants.

Alternative D provides similar restrictions to minimize habitat loss and fragmentation in all habitat types, including sagebrush and desert shrubs. The areas disturbed and reclamation of disturbed areas are similar, thereby adversely impacting habitat quality in all habitat types, including sagebrush. Other than wind-energy, Alternative D is not expected to restrict activities that could result in habitat fragmentation and, other than salt cedar, is not expected to slow the spread of INPS in the planning area. Livestock grazing is similar under Alternative D.

Grassland Species – Under Alternative D, there are no specific management actions for neotropical migrants that utilize grasslands. These species would be impacted by actions in grassland habitats, such as surface-disturbing activities, reclamation, INPS control, and livestock and wildlife grazing. Alternative D does not manage to protect habitat fragmentation, which would result in adverse impacts to grassland habitats and grassland species.

Riparian and Wetland Species – Alternative D actions that protect, enhance, and restore water and riparian and wetland habitats are anticipated to benefit neotropical migrants that use riparian and wetlands. For example, Alternative D manages lotic and adjacent riparian and lentic habitats toward DPC compared to DFC. Alternative D also develops more (100) acres of surface water, is expected to increase habitat for neotropical migrants, improve floodplain connectivity and function on more acres, and restore more incised stream miles and lentic habitats.

Alternative D treats more acres of salt cedar in the planning area, thereby reducing the adverse impact of the spread of INPS on riparian habitat diversity. Although treatment of salt cedar results in improved breeding and migratory habitats for neotropical migrants, Alternative D leaves at least 850 acres of salt cedar, which would provide seed for further spread of INPS.

Nongame (Mammals)

Approximately 9,663 acres of identified “rock outcrops/badlands” on BLM-administered land could contain bat habitats. The areas include steep terrain and, because Alternative D does not prohibit surface-disturbing activities on slopes greater than 25 percent, adverse impacts to bat habitats could occur. Alternative D actively markets wind-energy development, which may adversely impact bats due to bat collisions with wind towers.

Nongame (Reptiles and Amphibians)

Although there are no specific management actions for reptiles and amphibians, these species are impacted by other biological resource management actions under Alternative D. The impacts of management actions on these habitat types are discussed throughout this section.

Based on all the factors described and the current challenges within the planning area, Alternative D is anticipated to have more beneficial and similar adverse impacts to 8 of the 11 wildlife categories in the planning area. Alternative D is anticipated to have similar beneficial and adverse impacts to trophy game and nongame (mammals), while having more beneficial and less adverse impacts to nongame (raptors).

Alternative E (Preferred Alternative)

Potential impacts to wildlife categories are described in this section in relation to the intensity of allowable uses and management actions comprising Alternative E and in the context of the types of impacts described in Impacts Common to All Alternatives. Potential impacts to statutory wildlife categories from Alternative E are described relative to Alternative A.

Surface-disturbing Activities. Alternative E includes more restrictions regarding surface disturbance, but less compared to Alternative B. For example, Alternative E allows, but minimizes, surface occupancy (NSO) on highly erosive soils and prohibits surface disturbance on slopes greater than 25 percent without permission from the authorized officer. Alternative E is similar in that requirement of temporary protective surface treatment on disturbed areas is applied on a case-by-case basis. Moreover, Alternative E has less BLM-administered surface with high potential for water erosion and less BLM-administered surface with high potential for wind erosion subject to no or only minor restrictions on surface activities. Alternative E prohibits use of heavy equipment in all big game crucial winter range, except where human safety is at risk. Alternative E also rehabilitates all suppression-related damage as needed, but includes use of chemicals to control INPS when present. Alternative E also uses an integrated management technique approach to reduce fuels to protect high priority areas or resources including, but not limited to, wildlife habitats. Overall, the tactical constraints, fuel management approach, rehabilitation, and use of prescribed fire under Alternative E are anticipated to benefit wildlife habitat more than Alternative A.

Once surface disturbance occurs, reclamation requirements under Alternative E are anticipated to reduce adverse impacts to wildlife habitats. For example, Alternative E requires reclamation be completed in three growing seasons. In addition, Alternative E requires salvage and segregation of topsoil or alternative soil-handling methods, use of native species of vegetation, and use of certified weed-free seed for reclaiming disturbed areas.

OHV use under Alternative E is more restricted and, therefore, more beneficial to wildlife habitats. Alternative E closes and reclaims all existing roads and trails on BLM-administered surface that are in areas designated as highly erosive soils and not being utilized to meet public demand. The closure of roads and trails is anticipated to benefit wildlife habitats by reducing habitat fragmentation, erosion, and pollutant runoff coming from roads and trails.

Wildlife-disturbing Activities. Use of prescribed fire under Alternative E is anticipated to benefit wildlife habitat more than in Alternative A. For example, Alternative E uses prescribed burning to achieve measurable watershed level objectives for wildlife and other resource programs, reduce hazardous fuels, and reintroduce fire into fire-adapted ecosystems in the planning area. Alternative E develops wildland fire use plans; however, it allows natural ignitions within areas with wildland fire use plans to meet desired management objectives. Moreover, Alternative E focuses wildland fire use plans within aspen, juniper, and true mountain mahogany communities, which are anticipated to benefit wildlife.

No salt cedar would be targeted for eradication; however, Alternative E inventories and develops a treatment plan to reduce or eliminate salt cedar stands over the life of the plan. Alternative E also develops and implements a comprehensive management plan for controlling INPS in the planning area. Alternative E may require holding livestock for 72 hours prior to movement on or within public lands to control the spread of INPS on BLM-administered lands. The plan and specific actions to control INPS identified for Alternative E are anticipated to slow the spread of INPS within the planning area and thereby benefit wildlife habitat.

Proactive Management Actions. Proactive management actions under Alternative E are anticipated to benefit wildlife because of management toward DPC under Alternative E compared to management toward PFC or DFC. Forest management under Alternative E focuses on maintaining or restoring the health of forest stands while providing forest products; Alternative E identifies snags to be left for wildlife. Alternative E also treats woodland encroachment in grassland, sagebrush, aspen, and other vegetative communities where determined to be detrimental to other resource values and uses. Treating encroachment of woodland species could benefit grassland, sagebrush, and shrubland wildlife species. Aquatic habitats also benefit more under Alternative E. For example, Alternative E constructs an additional 100 acres of surface water in the planning area.

Another proactive management action proposed by Alternative E is the annual prohibition of surface development from November 15 through April 30 on all big game crucial winter ranges (see Map 23). Exceptions could be granted by the BLM under Alternative C; however, a wildlife mitigation plan is required under Alternative E, thereby providing additional protection to big game habitats.

Alternative E proposes a proactive management action to avoid or minimize the adverse impacts from habitat fragmentation. The alternative protects wildlife habitats from fragmentation. The protected contiguous blocks of land also prohibit wind-energy development. Alternative E limits wind-energy development to power classes 4 through 7 (see Table 3-26). Minimizing the adverse impacts of habitat fragmentation is anticipated to benefit all wildlife categories described in this section.

Alternative E provides more protection to surface water from potential impacts associated with soil erosion and runoff from disturbed areas and from other actions. For example, Alternative E institutes a CSU restriction as described for Alternative B, except this restriction is applied to only Class 1 and 2 streams (refer to Glossary); remaining streams would be considered on a case-by-case basis. Alternative E also requires fencing all new and existing wells and reservoirs, as well as developed springs to exclude livestock or wildlife, thereby avoiding degradation of these water sources. Alternative E also rehabilitates or redevelops all BLM-authorized well and spring developments producing 10 or more gallons per minute, regardless of whether issues arise, thereby benefiting water sources and associated wildlife habitat more than Alternative A. For developments less than 10 gallons per minute, the BLM considers rehabilitation on a case-by-case basis. Under Alternative E, these restrictions are anticipated to benefit water quality and wetland and riparian areas more than Alternative A.

Alternative E also protects or enhances riparian, wetland, and streamside habitats more than Alternative A. For example, Alternative E would, as necessary, use fencing, develop alternative water sources, manager livestock, place supplements, and adjust pasture boundaries and season of use to protect wetland, riparian areas, and streamsides. Management of runoff from roads and other impervious surfaces or disturbed areas is accomplished under Alternative E through requirement of an SWMP. BLM could require an SWMP on all actions impacting more than 1 acre under Alternative E. This requirement is more restrictive and is anticipated to benefit water quality and associated wildlife habitats more than Alternative A.

Alternative E maintains the existing Jackson Canyon ACEC for bald eagles but also proposes to establish the Bates Hole SMA to benefit greater sage-grouse and watershed values. The benefit of a Bates Holes SMA is anticipated to extend to other sagebrush and grassland species beyond the greater sage-grouse. Alternative E designates an ACEC for black-tailed prairie dogs that also benefits other grassland wildlife species. Alternative E also maintains the North Platte River SRMA and establishes the South Bighorns/Red Wall SMA, both of which are anticipated to benefit wildlife habitats. The establishment of SMAs and designation of ACECs for special status and wildlife species are anticipated to add restrictions on resource use and uses in these areas, thereby limiting human disrupting activities and associated habitat loss, degradation, and fragmentation. Overall, the designations under Alternative E are anticipated to benefit wildlife more than in Alternative A.

Big Game

Alternative E reduces habitat loss and fragmentation due to restrictions on development, which lessen the amount of disturbed surface and protect large contiguous blocks of land from fragmentation. Moreover, Alternative E restricts wind-energy development and OHV use to the benefit of wildlife habitat. The addition of more surface water acres and the greater protection of existing water sources also are anticipated to enhance wildlife habitats to a greater extent under Alternative E. Alternative E restores and protects important riparian and wetland habitats more than Alternative A and manages different vegetation types (e.g., sagebrush, aspen, etc.) deemed important to wildlife toward DPC compared to management toward DFC. Alternative E also more effectively controls INPS.

Trophy Game

Alternative E prohibits bear baiting within 1 mile of all BLM recreational developments in the planning area. This restriction minimizes the potential for conflicts between humans and bears. Black bears also are affected by management actions in forest and woodland habitats.

Mountain lions generally utilize similar habitats as mule deer—their primary prey. Although there are no specific management actions for mountain lions in the alternatives, mountain lions are impacted by management actions for mule deer and big game habitats.

Furbearing Animals

No specific management actions for furbearing animals exist, but these species are impacted by other biological resource management actions. Badger, bobcat, and weasel are habitat generalists and, therefore, are impacted by a variety of actions in all habitat types. Impacts to various vegetation types can be found throughout this section.

Specific management actions in Alternative E are aimed at maintaining older forests and woodland stands to benefit wildlife. Management actions that promote old-growth characteristics benefit the American marten. Alternative E manages ponderosa pine stands for old growth (including snags) in Little Red Creek, Esterbrook, and Jackson Canyon. In other areas, the emphasis is on the sustainable flow of wood products. Alternative E places increased importance on the value of aspen communities by managing for DPC.

Alternative E manages lotic and adjacent riparian and lentic habitats toward DPC to the benefit of beaver, muskrat, and mink. Alternative E's action to develop an additional 100 acres of surface water increases habitats for beaver, muskrat, and mink. These species also benefit by improved habitat and water quality, including improved floodplain connectivity and function.

To minimize damage to critical riparian habitats, Alternative E protects and enhances riparian and wetland management by managing livestock and grazing wildlife in these areas. Management actions

could include fencing, developing alternative water supplies for livestock, herding, placing feed and mineral supplements away from water sources, and adjusting pasture boundaries and season of use. These actions apply only to those streams on BLM-administered lands rated as nonfunctional or functional at-risk; however, these actions are anticipated to ultimately result in riparian systems with improved vegetation and structural diversity throughout the planning area, leading to an increase in habitat for beaver, muskrat, mink, and other wetland and riparian species.

Predatory Animals

Alternative E actions benefiting different vegetative types in the planning area are anticipated to benefit habitat generalists, such as predatory animals.

Small Game

Alternative E actions benefiting forests, woodlands, riparian areas, and other habitat types utilized by small game are anticipated to benefit habitat generalists, such as the cottontail rabbit, as well as more habitat specific species, such as the snowshoe hare, red squirrel, fox squirrel, and gray squirrel.

Game Birds

The sharp-tailed grouse is the only game bird (except for the greater sage-grouse, discussed in the Special Status Species – Wildlife section) with specific management actions. Sharp-tailed grouse buffer zones are the same under Alternative E. Sharp-tailed grouse, as well as Hungarian partridge and chukar, inhabit grasslands on the planning area and are anticipated to be impacted by actions affecting this vegetative type. Ring-necked pheasants, blue grouse, and wild turkey also are anticipated to be impacted by Alternative E actions, which impact other habitat types.

Migratory Game Birds

Alternative E actions pertaining to water and riparian and wetland habitats are anticipated to benefit migratory game birds. Alternative E manages lotic and adjacent riparian and lentic habitats toward DPC compared to PFC. Alternative E also constructs 100 acres of water reservoirs, improves floodplain connectivity and function, and restores incised streams and lentic habitats.

Nongame (Raptors)

Under Alternative E, the BLM avoids surface disturbance within ½ mile of most raptor nests between February 1 and July 31; however, common or smaller species would have ¼-mile buffers. Species with ¼-mile buffers include the red-tailed hawk, Swainson's hawk, American kestrel, osprey, great horned owl, long-eared owl, northern saw-whet owl, common barn owl, and western screech owl. Alternative E restrictions around raptor nests are more extensive, thereby resulting in fewer direct impacts to nesting raptors. In addition, Alternative E limits wind-energy development compared to Alternative A, thereby limiting potential collisions and electrocution of raptors. However, 461 raptor nests and 13 bald eagle roosts currently occur on BLM-administered land rated as outstanding/superb and fair/good/excellent potential for wind energy. Without proper siting, Alternative E has the potential to adversely impact raptors species. Alternative E manages sagebrush, aspen, and other vegetative types to DPC, restores and protects riparian areas, restricts livestock grazing, and increases control of INPS. These actions are anticipated to benefit birds and small mammals comprising raptor prey in the planning area.

Nongame (Neotropical Migrants)

Alternative E actions pertaining to forest management; management of sagebrush, aspen, mountain shrub, lotic, and lentic habitats toward DPC; INPS control; habitat fragmentation; and creation and protection of water sources are anticipated to benefit nongame neotropical migrants in the planning area.

Forest and Woodland Species – There are specific management actions in Alternative E aimed at managing forests and woodlands to benefit wildlife. For example, Alternative E emphasizes multiple use, which would result in a diversity of forests types and ages and ultimately result in a diverse bird community. Management actions that promote open, old-growth characteristic benefit many neotropical migrants. In addition, Alternative E manages ponderosa pine stands for old growth (including snags) in Little Red Creek, Esterbrook, and Jackson Canyon. In other areas, the emphasis is on the sustainable flow of wood products. Clear-cuts could be up to 20 acres in size, which could increase impacts of habitat fragmentation for forest-interior species. Alternative E places increased importance on the value of aspen communities by managing for DPC.

Mountain Shrub Species – The BLM places an increased importance on mountain shrub communities under Alternative E by managing these communities for DPC compared to DFC.

Sagebrush and Desert Shrub Species – Species that utilize or depend on sagebrush habitats would benefit from management actions for greater sage-grouse, as discussed in the Special Status Species – Wildlife section. Because the breeding season of greater sage-grouse and neotropical migrants coincide, many species of neotropical migrants would benefit from buffers around greater sage-grouse leks and nesting and early brood-rearing habitats. Alternative E protects larger buffers around greater sage-grouse leks and the same-size buffers around nesting and early brood-rearing habitats, thereby benefiting sagebrush and desert shrub neotropical migrants.

Implementing Alternative E results in more careful planning in the extent and location of surface-disturbing activities. Instead of implementing vegetative treatments on a case-by-case basis, Alternative E emphasizes habitat and structural diversity and encourages active management to achieve specific objectives for wildlife habitat. In addition, BLM manages all sagebrush habitats toward DPC. Reclamation from disturbance, including reseeding, is required within three growing seasons. Although surface disturbance results in short-term habitat loss and damage, the reclamation requirements of Alternative E help maintain long-term habitat quality across the planning area. Alternative E also seeks to minimize adverse impacts to sagebrush and other habitats from the spread of INPS by implementing a comprehensive weed management plan. Under Alternative E, the BLM would monitor grazing leases and adjust or convert as needed; changes would be consistent with rangeland health objectives. This monitoring includes the prevention of downward trends on all allotments. Impacts to sagebrush and desert shrub occur under Alternative E; however, the habitat fragmentation action of Alternative E also protects sagebrush and desert shrubs from habitat fragmentation.

Grassland Species – Although there are no specific management actions for neotropical migrants that utilize grasslands, these species benefit by management actions under Alternative E that treat woodland encroachment into grassland habitats where it is detrimental to grassland species. These species are impacted by actions in grassland habitat, such as surface-disturbing activities, reclamation, INPS control, and livestock and wildlife grazing. Grassland habitats could be impacted by long-term surface disturbance on BLM-administered land under Alternative E; however, the habitat fragmentation action of Alternative E also protects grassland habitat from habitat fragmentation.

Riparian and Wetland Species – Although there are no specific management actions for neotropical migrants that use riparian and wetland habitats, these species benefit by other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats. Alternative E manages toward PFC and identifies DPC for lotic and adjacent riparian and lentic habitats. An additional 100 acres of surface water is developed under Alternative E, which would increase habitat for neotropical migrants. These species also benefit by improved habitat and water quality. Alternative E improves floodplain connectivity and function on streams and would restore incised streams and lentic

habitat. Alternative E inventories areas infested by salt cedar and develops a treatment plan for eradicating salt cedar over the life of the plan.

Livestock and wildlife tend to congregate at water sources and can, if unmanaged, result in damage to critical riparian habitats. Alternative E protects and enhances riparian and wetland management by managing livestock and grazing wildlife in these areas. Management actions could include fencing, developing alternative water supplies for livestock, herding, placing feed and mineral supplements away from water sources, and adjusting pasture boundaries and season of use. These actions ultimately result in a riparian system with increased vegetation and structural diversity, leading to an increase in abundance and diversity of neotropical migrants.

Nongame (Mammals)

Bats that use caves for roosting, maternity colonies, or hibernation could be affected by surface-disturbing activities near caves, cliffs, or other rock features. There are 9,663 acres of identified "rock outcrops/badlands" on BLM-administered land that could contain potential bat habitats. These areas include steep terrain. Alternative E restricts most surface-disturbing activities on slopes greater than 25 percent; therefore, most cave habitats are expected to be protected. No specific management actions exist for abandoned mines. All bats could be adversely impacted by wind-energy facilities, as discussed for raptors.

Nongame (Reptiles and Amphibians)

Although there are no specific management actions for reptiles and amphibians, these species are impacted by other biological resource management actions under Alternative E. The impacts of management actions on these habitat types are discussed throughout this section.

Based on all the factors described and the current challenges within the planning area with the exception of establishing the proposed Wind River SMA, Alternative E is anticipated to have more beneficial and similar adverse impacts to all of the 11 wildlife categories in the planning area.

4.4.6.3 Conclusion

Overall, Alternative B provides more measures to minimize habitat loss and fragmentation in the planning area compared to Alternative A. Alternative C includes similar measures to Alternative B, but allows more surface-disturbing activities. Alternatives A and E allow similar acres of surface disturbance, more than alternatives B and C; however, Alternative E is expected to have less potential adverse impact than Alternative A due to more restrictions. With the exception of limiting wind-energy development, Alternative D has few measures with which to control habitat loss and fragmentation. Moreover, Alternative D allows the most surface disturbance of any alternative, potentially resulting in substantial adverse impacts to wildlife resources.

Implementing Alternative B, followed by Alternative C, could result in more improvements to habitat quality, provide more measures to restrict activities that could damage sensitive soils and habitats, reserve more forage for big game on crucial winter range, and set aside more lands for new SMAs with emphasis to benefit wildlife resources. Alternative A has minimal guidance to protect or improve habitat quality. In general, Alternative E has similar measures to protect and improve habitat quality as under Alternative C; however, under Alternative E, less land is set aside for new SMAs. Alternatives A and D do not establish any new SMAs. Alternative D does not restrict surface-disturbing activities in most sensitive areas and has few actions to improve habitat quality. Comprehensive INPS management plans provided in alternatives B, C, and E could result in long-term beneficial impacts to wildlife habitat quality. Lack of comprehensive management under alternatives A and D could increase spread of INPS across the planning area and continue to degrade wildlife habitats.

Alternative B provides the most protection for big game on crucial winter ranges from surface-disturbing activities and OHV use. Alternatives A, C, and E have similar protection from surface-disturbing activities, but Alternative C has more restrictions on OHV use during critical wildlife periods. Under Alternative D, establishing the proposed Wind River Basin SMA removes discretionary wildlife stipulations from approximately 50 percent of the SMA. Alternative E has some OHV restrictions on crucial winter range. Based on the actions and uses identified, alternatives ranked in order of increasing potential adverse and decreasing beneficial impacts to the wildlife categories presented in this section are B, E, D, A, and C.

4.4.7 Special Status Species – Plants

Actions that could occur through implementation of each alternative have the potential to affect special status plant species conservation and recovery. This section describes the impacts of each alternative on special status plants in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts are also described as beneficial or adverse with respect to special status plant species. See Map 25 for select special status plant species.

Allowable uses and management actions that contribute to the decline in abundance or distribution of special status plants are considered adverse. Conversely, beneficial impacts to special status plants consist of those activities that protect habitat or reduce the risk of harm to these species in the planning area. An increase in special status plant numbers over time in response to an enhanced habitat or the increased viability of a species is considered a beneficial impact.

Direct impacts to special status plant species are defined, for this analysis, as actions resulting in damage to or loss of individual special status plants, fragmentation of habitat, loss of habitat quality, loss of pollinators, and loss of soil seed banks. Surface-disturbing activities, herbivory, trampling, fire, and herbicide application are considered the primary means by which direct impacts to special status plants could occur. Activities that create or increase competition between special status plants are also considered direct impacts. Plant collection and OHV use also could directly impact special status plant populations. Indirect impacts to special status plant species are defined as actions that aid or compromise the protection of special status plants. The loss or degradation of suitable habitat for special status plant species is considered a direct impact. Indirect impacts to potential habitats for special status plants also could occur when actions change the habitats in a way that makes them unsuitable for future colonization.

For the purpose of this analysis, short-term impacts to special status plant species include those activities that contribute to the decline in abundance or distribution of a species within 5 years of when the activity occurs. Long-term impacts to special status plants are those that require more than 5 years to manifest on the surface.

4.4.7.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Where resources overlap, management actions associated with protecting wildlife habitats and cultural resources directly benefit special status plant species.
- All surface-disturbing activities require reclamation according to the Casper Field Office's *Reclamation Monitoring Plan*. New oil and gas leases have stipulations (COAs) for protection of special status plant species (see Appendix I).
- The total amount of new surface disturbance allowed by an alternative is a good index of potential impacts to special status plants. Success of reclamation measures prescribed as a condition of development is unknown, and could underestimate the potential impact of surface disturbance on special status plant populations.

- The existing provisions in place (e.g., presence/absence surveys conducted prior to proposed actions) to protect special status species are carried out and conditional monitoring is conducted (e.g., grazing and surface disturbance reclamation) to ensure special status species are not jeopardized.
- Management toward DPC is assumed to exceed the requirements of managing toward DFC.
- Establishing SMAs that preclude or restrict development, including those not specifically aimed at conserving special status plant species, are assumed to benefit special status plant species where populations overlap with SMA boundaries.
- Because not all locations of special status plant species in the planning area are known and because the locations of potential actions under the different alternatives also are not known, the analysis of potential impacts to special status plant species focuses on the threats and management challenges identified in Chapter 3.
- Assumptions described in the Special Status Species - Fish section were used in analyzing the impacts on the western prairie fringed orchid, which occurs along the Platte River System and may be impacted by water use in the planning area.
- Because the densities and locations of special status plant species in the planning area are not entirely known, impact analyses are based on the amount of vegetation and soil disturbed, the threats identified for special status plant species in Chapter 3, and the level of restrictions placed on BLM actions that could adversely impact special status plant species.
- Consultation with the USFWS and following conservation measures identified in the Biological Assessment for all listed and sensitive species for the BLM's *Draft Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic EIS* (PEIS) are anticipated to mitigate most impacts to special status plant species.

4.4.7.2 Analysis of Alternatives

Allowable uses and management actions having the potential to impact special status plant species include all surface-disturbing activities, concentrated livestock and native ungulate grazing, OHV use, INPS, fire management, water depleting activities with the North Platte Watershed, and proactive management actions.

As special status plant species are impacted by the alternatives, they can, in turn, impact resource uses. For example, actions designed to conserve special status plant species could limit livestock grazing, mineral development, fire management and ecology, vegetation treatments, OHV use, and control of INPS. The impacts of special status plant species on other resource topics (e.g., fire management and ecology, etc.) are not anticipated to be substantial; however, as appropriate, they are discussed under the appropriate impacted resources.

Impacts Common to All Alternatives

The types of impacts projected to occur to special status plant species as a result of the various alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative. Described below are potential types of impacts common to all alternatives.

Habitats for special status plants can be impacted by various surface-disturbing activities, such as energy and mineral exploration and development and the associated roads, ROWs, and corridors. Other activities that may remove or trample vegetation and disturb soil, thus potentially adversely impacting habitats for

special status plant species, include intensive recreational use, human collection, fire, unstructured recreation, and concentrated livestock and native ungulate grazing. Because none of the special status plants that may occur in the planning area depend on forest habitats, forest management and silviculture treatments are not expected to impact special status plant species. Surface disturbance also can indirectly impact special status plants by contributing to soil erosion resulting in adverse impacts to watershed health. Erosion also contributes to the transport of INPS along the network of water courses within the planning area. Soil compaction and erosion, alteration of hydrologic regimes, insecticide applications that may kill pollinators, modified fire return intervals, and invasion of native habitats by INPS are potential indirect and long-term impacts to special status plant species.

Habitat is fragmented by activities such as construction of roads, trails, ROWs, and corridors.. Fragmentation adversely affects special status plants by increasing the amount of habitat edge (Knight et al. 2000), which leads to noxious weed proliferation and microclimate alterations through increased wind and solar exposure. Populations of special status plants frequently have a patchy distribution across the landscape; therefore, elimination of one or more populations can prevent gene flow among populations if residual populations are too far apart for sufficient cross-pollination. Natural surface road networks also contribute to a reduction in photosynthetic capacity in plants adjacent to roads due to dust deposits on leaf surfaces (Knight et al. 2000). These types of impacts are considered long-term because they generally persist for more than 5 years.

A portion of the surface disturbance that occurs under each alternative is reclaimed in accordance to the Casper Field Office's *Reclamation Monitoring Plan.* However, not all impacts to special status plants from surface disturbance are offset by reclamation of disturbed lands because reclaimed lands often do not support the same plant community structure and composition as the habitat that was disturbed. Many special status plants are rare because of their association with a rare habitat or landscape feature. These plants might not re-establish on reclaimed lands if the unique habitat characteristics they require are no longer present. Moreover, INPS may establish on reclaimed lands and prevent full restoration of historical plant communities. These types of impacts are considered long-term because they generally persist for more than 5 years.

Grazing (both livestock and wildlife) may provide both adverse and beneficial impacts to special status plant species, depending on grazing intensity, timing/season of grazing, range conditions, and precipitation regimes. The Colorado butterfly plant is an example of a special status plant species that may benefit from grazing under certain conditions due to the removal of competing vegetative cover (Fertig 2000c). However, if grazing animals are not rotated or are concentrated in small areas during the plant's flowering season, grazing could adversely impact this species on some sites (Fertig 2000c). Blowout penstemon is another special status plant species that may benefit from grazing under certain conditions by controlling competing vegetation. Grazing, particularly in sensitive riparian areas, can result in direct mortality to special status plants through trampling or herbivory and indirect impact due to soil compaction and erosion, changes in plant community composition and structure, and increased spreading of INPS (Fitch and Adams 1998). Inappropriate livestock grazing is a threat to Laramie columbine, western prairie fringed orchid, and Ute ladies'-tresses. Grazing has been considered a factor in the endangerment of 33 percent of all imperiled plant species in the United States (Wilcove et al. 1998).

Some management actions would generally benefit all special status plants. For example, management actions to control INPS may benefit special status plants by reducing competition. However, it is important to note that restoration of native habitats to pre-INPS densities and species composition should accompany INPS control for special status plant species to be enhanced by changed plant competition.

Other resource management actions that may indirectly benefit special status plant species include surface disturbance constraints to protect erosive soils, visual and cultural resources, SMAs for natural and

cultural resources, fish and wildlife, vegetation, and NHTs and other Historic Trails. Where these constraints overlap with suitable habitat for special status plant species, benefits are anticipated for Porter's sagebrush, Nelson's milkvetch, and Laramie false sagebrush.

Activities in the planning area that deplete groundwater may adversely impact the Colorado butterfly plant, western prairie fringed orchid, and the Ute ladies'-tresses. These species inhabit or depend on habitat associated with riparian and wetland areas, floodplains, groundwater. For example, management actions under all alternatives could impact populations of the western prairie fringed orchid along the Platte River due to water depletions in the portion of the planning area that falls within the North Platte watershed. In the planning area, water depletions, though they occur hundreds of miles upstream, can affect population abundance and the availability of suitable habitats for federally listed birds, fish, and one plant in the Platte River System. The inundation or decline of wetland habitats due to flow regulation and reduced water availability can adversely impact wetland plants (National Research Council 2005). The management of the following primary resources and resource uses is anticipated to influence the quality and quantity of water in the Platte River watershed: minerals, livestock grazing, and fish and wildlife. See the Special Status Species – Fish section for a more detailed description of water depletion impacts in the North Platte watershed.

Alternative A

Surface-disturbing Activities. Surface-disturbing activities, such as oil and gas development, road construction, and other mechanized disturbance, could impact potential habitats for special status plants and undocumented populations. Such activities fragment habitats, which can isolate populations of special status plants. Long-term impacts such as habitat fragmentation and isolation of populations are difficult to mitigate; however, short-term impacts from surface disturbance are mitigated by reclamation. Reclamation of disturbed areas minimizes soil erosion and reduces opportunity for establishment of INPS which compete with special status plant species. However, despite reclamation, surface disturbance can have long-term impact on some sensitive plant populations occurring on reclaimed lands through changes in plant community structure or encroachment of INPS. BLM actions under Alternative A are anticipated to impact 59,990 acres and 21,087 acres in the short- and long-term, respectively, in the planning area over the life of the plan. No specific constraints on resource management to minimize habitat fragmentation are identified for Alternative A.

Livestock and Native Ungulate Grazing. Approximately 6,016 acres currently are unavailable to livestock grazing in the planning area. Under Alternative A, livestock grazing is managed to prevent overgrazing and a downward trend on all leases with an emphasis on Category I and M (see Glossary) grazing allotments. Approximately 10 percent of planning area grazing allotments are evaluated each year to determine whether they meet the standards for healthy rangelands. Management of livestock grazing in riparian and wetlands areas is managed on a case-by-case basis. Since livestock utilization levels and placement of water developments are managed on a case-by-case basis, some rare plant populations and habitats in areas with incomplete assessments could be impacted by heavy grazing and trampling; however, BLM uses appropriate regulatory and policy mechanisms to minimize or avoid adverse impacts.

The trend of continued improvement in rangeland productivity in the planning area is expected to continue under current management. Despite this upward trend, potential adverse impacts to special status plant species from livestock grazing include transport of INPS, soil erosion and compaction at livestock concentration areas, and removal of vegetation. These adverse impacts are not anticipated around known locations of special status plant species; however, direct and indirect adverse impacts could occur at unknown locations. Native ungulates are anticipated to have similar adverse impacts as livestock to special status plant species in areas where they concentrate, typically water sources.

INPS. Management for INPS could directly benefit special status plants by eliminating direct competition and maintaining habitat health and diversity. Competition from INPS is identified as a potential threat to the Colorado butterfly plant, western prairie fringed orchid, Laramie false sagegbrush, and Ute ladies'-tresses. Under Alternative A, the spread of INPS is handled on a case-by-case basis, and anticipated to provide some benefits to special status plants threatened by INPS. Alternative A does not require livestock flushing before entering public lands or transferring between public lands to minimize transporting INPS in fecal material. Road construction under Alternative A contributes to transportation and dispersal of INPS seeds into special status plant habitats, which could have adverse impacts on special status plant habitats.

OHV Use. OHV use disturbs soils and removes vegetation, thus potentially impacting habitats for special status plants. Due to trampling, OHV use is identified as a threat to Laramie columbine, Nelson's milkvetch, and Laramie false sagebrush. OHV use is limited to existing roads and trails, but there is no coordinated planning to close new, unauthorized road and trails under Alternative A. In addition, Alternative A closes the smallest area to OHV use and includes the largest area limited to existing roads and trails for OHV use. The anticipated soil disturbance, vegetation removal, and transport of INPS under Alternative A is anticipated to indirectly and adversely impact unknown populations of special status plant species.

Fire Management and Ecology. Alternative A uses prescribed burning to manipulate vegetation in areas identified for treatment by the range, forestry, and wildlife programs. Special status plant species in the planning area are not anticipated to be adversely impacted by prescribed fire that mimics a natural fire regime. However, the lack of a natural fire regime or fire suppression are identified as potential threats to the Colorado butterfly plant, blowout penstemon, and the western prairie fringed orchid. Intense wildland fire suppression tactics are anticipated to be the most likely actions to adversely impact undocumented populations of special status plant species. Alternative A manages rehabilitation and stabilization following wildland fire on a case-by-case basis. In addition, Alternative A does not use an integrated management approach to reduce fuels and protect high priority areas or resource values. Alternative A does restrict use of heavy equipment in elk crucial winter range or to construct fire lines in areas containing wagon ruts.

Proactive Management Actions. Management of other resources could indirectly impact special status plants. Beneficial impacts to special status plants occur with the protection and conservation of land for other resources overlap with locations of special status plant species. Current protection for special status wildlife species, such as the greater sage-grouse, and cultural resources may benefit some special status plant habitats; however, the level of protection is unknown because the precise location of all special status plant species in the planning area is unavailable.

Under Alternative A, vegetation management is directed toward achieving DFC of plant communities on a case-by-case basis. Vegetation management towards DFC in the planning area is not specifically targeted at benefiting one of the 9 special status plant species identified in Chapter 3.

Water depletions in portions of the planning area within the North Platte River watershed are summarized under each alternative in the Special Status Species – Fish section of this chapter. The number of wells and water developments projected under Alternative A are expected to cause depletions of approximately 79.4 acre-feet to the Platte River System and may adversely impact the western prairie fringed orchid along the Platte River. The Colorado butterfly plant and the Ute ladies'-tresses may also be adversely impacted by water depletions within the planning area as these species occur in floodplains, drainage bottoms, or riparian and wetland areas and are dependent on subirrigation or otherwise moist habitats. Because no water impoundments are developed for fish and wildlife, Alternative A results in the lowest

amount of average annual water depletions of all alternatives and, thus, has the least potential to adversely impact downstream special status plant species.

Management actions that protect known populations of special status plants provide direct beneficial impacts. Under Alternative A, water developments and salt, mineral, and forage supplements are designed on a case-by-case basis to avoid known special status plant populations. Water developments, mineral, and forage supplements attract animal concentrations and increase the potential of special status plants being trampled and grazed by livestock and wildlife.

Alternative B

Surface-disturbing Activities. Under Alternative B, approximately 39 percent less short-term and 45 percent less long-term disturbance are anticipated in the planning area from BLM actions compared to Alternative A. In addition to causing less disturbance, Alternative B reduces the potential for habitat fragmentation in the planning area by restricting mineral and renewable energy development within intact blocks of contiguous plant communities greater than 10,000 acres, depending on oil and gas potential and ownership. For example, Alternative B identifies 16 blocks comprising 413,552 acres of BLM-administered surface for protection from habitat fragmentation, compared to 0 acres under Alternative A. The restrictions on habitat fragmentation and fewer disturbed acres relative to Alternative A are anticipated to indirectly benefit special status plants by protecting potential habitat, minimizing the spread of INPS, and minimizing soil erosion.

Livestock and Native Ungulate Grazing. Alternative B generally allows livestock grazing over the same area identified under Alternative A; however, areas identified for the protection of specific resource values could be closed under Alternative B. Additionally, Alternative B proposes to monitor all grazing allotments each year and manage livestock grazing to limit forage utilization to 40 percent of the current year's production. Alternative B provides the most aggressive approach to the management of BLM grazing lands, including riparian areas. More effective monitoring, management, and implementation of some grazing systems could, under certain conditions, potentially benefit the Colorado butterfly plant and other special status plants. Increased protection of riparian resources will benefit special status plants, such as Ute ladies'-tresses.

The trend of continued improvement in rangeland productivity in the planning area is expected to accelerate under Alternative B relative to Alternative A. The anticipated adverse impacts to special status plant species from current livestock grazing are not anticipated around known locations of special status plant species; however, due to stricter management of livestock grazing, direct and indirect adverse impacts to unknown locations of special status plants under Alternative B are expected to be less than under Alternative A.

INPS. Alternative B develops a comprehensive INPS management program consistent with *Partners Against Weeds*. This program provides a more coordinated effort to reduce INPS in habitats of special status plants and minimizes habitat degradation from the spread of INPS across the planning area. In addition, Alternative B requires a 72-hour flushing period for livestock before entering onto or within public lands to minimize transporting INPS. Road construction under Alternative B is projected to be less than under Alternative A and, therefore, is expected to lessen the transportation and dispersal of INPS seeds into special status plant habitats.

OHV Use. Alternative B closes the largest area to OHV use and includes the smallest area limited to existing roads and trails for OHV use (see Table 2-1). The anticipated soil disturbance, vegetation removal, and transport of INPS under Alternative B are anticipated to produce the least indirect and adverse impacts to unknown populations of special status plant species compared to other alternatives.

Fire Management and Ecology. Alternative B uses prescribed burning on a broader landscape level than Alternative A and does not limit this tool for achieving objectives identified by the range, forestry, and wildlife programs. Alternative B manages rehabilitation wherever suppression-related damage occurs, including the use of chemicals to control INPS. In addition, Alternative B proposes to use an integrated management approach to reduce fuels and protect high-priority areas or resource values. Alternative B restricts use of heavy equipment in a broader area than Alternative A, including areas of cultural resource sensitivity, riparian and wetland habitats, big game crucial winter range, greater sage-grouse leks, and areas of highly erosive soils.

Proactive Management Actions. Alternative B sets aside the most land of any alternative for new SMAs that have management actions to benefit special status plant resources. This alternative provides the greatest opportunity of all alternatives to manage plant communities to maintain special status plant habitats.

Water depletions in portions of the planning area within the North Platte River watershed are anticipated to be the greatest (average water depletions of 2,014 acre-feet per year) under Alternative B. The proposed fish and wildlife reservoirs in Alternative B are expected to result in the highest amount of average annual water depletions of all alternatives and, thus, Alternative B has the highest potential to adversely impact the continued existence of the western prairie fringed orchid along the Platte River.

Alternative B provides maximum protection to known populations of special status plants. Water developments are not allowed within ¼ mile of special status plant populations, thereby affording special status plants some protection from direct trampling and grazing by livestock and wildlife due to water developments. The increased buffer compared to Alternative A aids in habitat protection and the potential expansion of the special status plant populations.

Alternative C

Surface-disturbing Activities. Under Alternative C, approximately 2 percent (58,689 acres) less short-term and 3 percent (20,358 acres) less long-term disturbance are anticipated in the planning area from BLM actions compared to Alternative A. In addition to causing less disturbance, Alternative C reduces the potential for habitat fragmentation in the planning area by setting aside blocks of land to protect from habitat fragmentation, similar to Alternative B. Alternative C identifies 8 blocks comprising 177,035 acres of BLM-administered surface containing big game crucial winter range or greater sage-grouse leks/habitat for protection. The restrictions on habitat fragmentation and fewer disturbed acres relative to Alternative A are anticipated to indirectly benefit special status plants by protecting potential habitats, minimizing the spread of INPS, and minimizing soil erosion. Adverse impacts from surface disturbance under Alternative C are anticipated to be less than under Alternative A.

Livestock and Native Ungulate Grazing. Alternative C generally allows livestock grazing over the same area identified under Alternative A and, similar to Alternative B, provides protection of specific resource values as needed. Under Alternative C, livestock grazing is managed to maintain a protective cover of vegetation and litter with emphasis on the condition of allotments with substantial acreage of highly erosive soils. The anticipated adverse impacts to special status plant species from livestock grazing are not expected around known locations of special status plant species; however, due to the requirement to target utilization on highly erosive soils, direct and indirect adverse impacts to unknown locations of special status plants under Alternative C are expected to be less than under Alternative A.

INPS. Alternative C develops a comprehensive INPS management program similar to Alternative B and could require a 72-hour flushing period for livestock before entering onto or within public lands to minimize transporting INPS. Road construction under Alternative C is projected to be less than under

Alternative A and, therefore, is expected to lessen the transportation and dispersal of INPS seeds into special status plant habitats compared to Alternative A.

OHV Use. Alternative C closes approximately three times as many acres to OHV use and designates about the same number of acres as limited to existing roads and trails for OHV use as Alternative A. The anticipated soil disturbance, vegetation removal, and transport of INPS under Alternative C are anticipated to produce less indirect and adverse impacts to unknown populations of special status plant species compared to Alternative A.

Fire Management and Ecology. Alternative C uses prescribed burning in a similar manner as Alternative B and includes management of rehabilitation wherever suppression-related damage occurs and control of INPS. Alternative C also proposes to use an integrated management approach to reduce fuels and protect high-priority areas or resource values similar to Alternative B. Use of heavy equipment for fire suppression under Alternative C is similar to Alternative B, except the former would not identify full protection areas.

Proactive Management Actions. Similar to Alternative B, buffers and restrictions for other resources will indirectly benefit habitats for special status plants. Compared to Alternative A, Alternative C sets aside more lands for new SMAs that have management actions to benefit special status plant resources. Water quality on the planning area will be maintained or improved, which would also benefit downstream resources, including populations of western prairie fringed orchid.

Water depletions in portions of the planning area within the North Platte River watershed are anticipated to be the second highest (average water depletions of 1,054 acre-feet per year) under Alternative C. Alternative C has a greater adverse impact on surface water quantity and the western prairie fringed orchid along the Platte River than under Alternative A, but less than under Alternative B.

Maintenance of special status plant habitats through protection and vegetative treatments is greater than under Alternative A. The increased buffer (500 feet) compared to Alternative A aids in habitat protection and the potential expansion of special status plant populations.

Alternative D

Surface-disturbing Activities. Under Alternative D, approximately 6 percent (63,649 acres) more short-term and 5 percent (22,080 acres) more long-term disturbance are anticipated in the planning area from BLM actions compared to Alternative A. Similar to Alternative A, Alternative D does not reduce the potential for habitat fragmentation in the planning area by setting aside blocks of land to protect from habitat fragmentation. Adverse impacts from surface disturbance under Alternative D are anticipated to be greater than under Alternative A.

Livestock and Native Ungulate Grazing. Alternative D generally allows livestock grazing over the same area identified under Alternative A and, similar to Alternative B, provides protection of specific resource values as needed. The emphasis of livestock grazing management under Alternative D is similar to Alternative A. The trend of continued improvement in rangeland productivity in the planning area is expected to continue under Alternative D, similar to Alternative A. The anticipated adverse impacts to special status plant species from current livestock grazing are not expected around known locations of special status plant species; however, due to the requirement to target utilization on highly erosive soils, direct and indirect adverse impacts to unknown locations of special status plants under Alternative D are expected to be similar to Alternative A.

INPS. Alternative D does not develop a comprehensive INPS management program, nor does it require a 72-hour flushing period for livestock before entering onto or within public lands to minimize transporting

INPS. Adverse impacts to special status plants from the spread of INPS are similar to Alternative A. Road construction under Alternative D is expected to be the most of any alternative and, therefore, is expected to contribute the most to the transportation and dispersal of INPS seeds into special status plant habitats. The lack of proactive INPS management under Alternative D could result in habitat degradation, a decline in habitat diversity, and adverse impacts to watershed health.

OHV Use. Alternative D closes a similar number of acres to OHV use and is limited to existing roads and trails as Alternative A. The anticipated soil disturbance, vegetation removal, and transport of INPS under Alternative D are expected to be similar to Alternative A.

Fire Management and Ecology. Alternative D uses prescribed burning in a similar manner as alternatives B and C. Alternative D also proposes to use an integrated management approach to reduce fuels and protect high-priority areas or resource values similar to Alternative B. Alternative D uses full protection strategies and tactics across the planning area, resulting in fewer adverse impacts to special status plants than Alternative A.

Proactive Management Actions. No new SMAs are proposed under Alternative D. Actions to bring or maintain vegetation toward DPC occurs on approximately 25 percent of aspen, sagebrush, and mountain shrub communities, resulting in a greater potential for maintaining special status plant habitats relative to Alternative A.

Water depletions in portions of the planning area within the North Platte River watershed are anticipated to be 272 acre-feet per year under Alternative D. Adverse impacts to the western prairie fringed orchid resulting from projected water depletion occurs under Alternative D and are greater than those anticipated under Alternative A.

Water developments are not allowed within 300 feet of known populations of special status plants, thereby affording special status plants some protection from direct trampling and grazing by livestock and wildlife due to water development. The increased buffer (300 feet) compared to Alternative A provides some habitats protection, but minimal expansion of the special status plant populations.

Alternative E (Preferred Alternative)

Surface-disturbing Activities. Under Alternative E, approximately 2 percent (61,274 acres) more short-term and 3 percent (21,672 acres) more long-term disturbance are anticipated in the planning area from BLM actions compared to Alternative A. Although projected surface disturbance is greater compared to Alternative A, the potential for habitat fragmentation in the planning area would be reduced under Alternative E by setting aside blocks of land to protect from habitat fragmentation. Alternative E identifies 8 blocks comprising 131,879 acres of BLM-administered surface, similar to Alternative C; however, all surface-disturbing activities within the 8 blocks are subject a CSU restriction under Alternative E. The restrictions on habitat fragmentation relative to Alternative A are anticipated to indirectly benefit special status plants by protecting potential habitats and minimizing the spread of INPS. Adverse impacts from surface disturbance under Alternative E are anticipated to be less than under Alternative A.

Livestock and Native Ungulate Grazing. Alternative E generally allows livestock grazing over the same area identified under Alternative A and, similar to Alternative B, provides protection of specific resource values as needed. The trend of continued improvement in rangeland productivity in the planning area is expected to continue. The anticipated adverse impacts to special status plant species from current livestock grazing are not expected around known locations of special status plant species; however, due to the requirement to target utilization on highly erosive soils, direct and indirect adverse impacts to

unknown locations of special status plants under Alternative E are expected to be less than under Alternative A.

INPS. Alternative E develops a comprehensive INPS management program similar to Alternative B and could require a 72-hour flushing period for livestock before entering onto or within public lands to minimize transporting INPS. Road construction under Alternative E is projected to be similar to Alternative A and, therefore, is expected to have similar transport and dispersal of INPS seeds into special status plant habitats.

OHV Use. The anticipated soil disturbance, vegetation removal, and transport of INPS material under Alternative E are anticipated to produce less indirect and adverse impacts to unknown populations of special status plant species compared to Alternative A.

Fire Management and Ecology. Alternative E uses prescribed burning in a similar manner as Alternative B, except management is achieved at a watershed level. Alternative E proposes to use an integrated management approach to reduce fuels and protect high-priority areas or resource values similar to Alternative B, except Alternative E protects a broader area as opposed to focusing on sensitive wildlife habitats.

Proactive Management Actions. Similar to Alternative B, buffers and restrictions for other resources, such as soils, will indirectly benefit habitats for special status plants under Alternative E. Alternative E sets aside additional lands for new SMAs having management actions to benefit special status plant resources. Riparian management benefits special status plants.

Water depletions in portions of the planning area within the North Platte River watershed are anticipated to be 270 acre-feet per year under Alternative E. Adverse impacts to the western prairie fringed orchid under alternatives D and E are similar and greater than under Alternative A and less than under alternatives B and C.

Alternative E provides protection to known populations of special status plants. Salt and mineral placement and water developments are restricted within 500 feet of areas inhabited by special status plants.

4.4.7.3 Conclusion

Known populations of special status plant species have more protection from water developments and a higher potential to expand populations under Alternative A. Alternative E allows water developments in areas with special status plant populations, but only if an analysis determines there to be no adverse impacts to special status plants.

Comprehensive INPS management plans provided in alternatives B, C, and E are anticipated to result in similar long-term beneficial impacts to special status plant species. Lack of comprehensive management in alternatives A and D is expected to increase the spread of INPS across the planning area and continue to degrade native habitats, including habitats for special status plant species.

Fewer acres are subject to surface-disturbing activities and habitat fragmentation under Alternative B, followed by alternatives C and E. These alternatives also have more provisions to protect sensitive soils and habitats, such as riparian areas, and include more management restrictions that could benefit special status plant species. Based on acreage of surface disturbance and acres protected from habitat fragmentation, alternatives with the least to most potential adverse impacts to special status plant species are alternatives B, C, E, A, and D. Surface disturbance under alternatives A and D would impact similar acreage, and neither identifies land managed to avoid habitat fragmentation. Alternative D also has the

highest potential to damage sensitive soils and habitats, potentially resulting in adverse impacts to special status plant species.

Special status plants potentially receive more indirect benefits from management for other resources, such as special status wildlife species and cultural resources, under alternatives B and C. Alternative B, followed by alternatives C and E, set aside the most land for new SMAs, which could indirectly benefit special status plants.

Alternative B potentially has the greatest impact on water quantity in the Platte River System downstream of the planning area, and potentially has the greatest adverse impact on the western prairie fringed orchid along the Platte River. Potential impacts to water quantity are lower under alternatives D, E, C, and A, with Alternative A resulting in the smallest projected water depletion in the North Platte River.

4.4.8 Special Status Species – Fish

Actions that could occur through implementing each alternative could impact Special Status Species – Fish. This section describes the impacts of each alternative on Special Status Species – Fish in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as beneficial or adverse.

No BLM-sensitive or federally listed fish species are in the planning area; however, the federally endangered pallid sturgeon occurs in the Platte River downstream of the planning area and could be impacted by management activities in the part of the planning area comprising the North Platte watershed (see Map 5). Additionally, there are 10 species recognized by the WGFD as Status 1-3 (NSS1-3, see Glossary), including lake chub, flathead chub, hornyhead chub, black bullhead, common shiner, finescale dace, pearl dace, plains topminnow, plains minnow, and suckermouth minnow (Appendix E). Wyoming NSS1-3 are species that may be rare to common, with declining or vulnerable habitats. The impacts to Wyoming NSS1-3 species are similar to those described for Fish and Wildlife Resources – Fish. This section focuses on the potential impacts of each alternative on pallid sturgeon.

Adverse impacts to the pallid sturgeon could occur through depletion of water in the Platte River System, resulting from water use in a portion (i.e., North Platte watershed) of the planning area. Adverse impacts to the pallid sturgeon also could occur through degradation of water quality in the North Platte watershed. Activities in the North Platte watershed portion of the planning area that would measurably reduce the quantity or quality of water in downstream reaches of the Platte River are considered indirect adverse impacts. Water depletions are considered a long-term adverse impact because implementation of management actions projected to cause water depletion is anticipated to occur over the life of the plan. Degradation of water quality is considered a short-term adverse impact because individual surface-disturbing activities are anticipated to occur over a relatively short period of time (less than 5 years). No direct or beneficial impacts to the pallid sturgeon are anticipated as a result of the alternatives described in Chapter 2.

4.4.8.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Water consumption in the North Platte watershed may adversely affect surface water quantity in the larger Platte River System. Water depletion analyses are based on the assumption that all water used for drilling and completion of wells, and evaporation from reservoirs within the North Platte watershed contributed to surface flows of the Platte River or its tributaries.

- For Platte River System species, the area evaluated includes the portion of the planning area drained by the North Platte River, as well as areas of the Platte River System downstream of the planning area.
- The number of projected oil and gas wells within the North Platte watershed vary by alternative and are estimated based on the potential for oil and gas development within the watershed.
- Based on assumptions for water use during well drilling, completion, and dust abatement, as well as for impoundment size and evaporation rates, each conventional oil and gas well uses approximately 2 acre-feet of water over the life of the plan.
- Produced water from CBNG drilling is assumed to have a negligible influence on surface water quantity and quality in the North Platte watershed.
- Management toward DPC is assumed to exceed the requirements of managing toward PFC.
- Because CBNG wells are air-drilled, drilling and completion of these wells do not result in depletion of water in the North Platte watershed (Bauer 2005).
- Most livestock water developments are implemented on I and M allotments (see Glossary). Approximately 46 percent of all I and M allotments in the planning area fall entirely or partially within the North Platte watershed.
- Livestock pits and reservoirs average approximately 1 acre in surface area. Each livestock well or spring maintains an average of two stock troughs approximately 10 feet in diameter (79 square feet [ft^2]) each, for a per-project surface area of 157 ft^2.
- Fish and wildlife impoundments each average approximately 5 acres in surface area.

4.4.8.2 Analysis of Alternatives

Allowable uses and management actions that could indirectly impact the pallid sturgeon include all surface-disturbing activities with potential to degrade water quality in the Platte River and water development actions able to deplete water quantity in the Platte River. The types of impacts projected to impact water quality and quantity in the North Platte watershed are anticipated to be common to all alternatives and, therefore, are discussed in the following section. The intensity of impacts to water quality and quantity are anticipated to vary by alternatives and are described in subsequent sections.

Impacts Common to All Alternatives

Reduced water flow in the Platte River can lead to adverse impacts on the ecosystems that support pallid sturgeon. Too little water at certain times of the year can limit the availability of forage fish to the pallid sturgeon (National Research Council 2005). Pallid sturgeon also may lose important migratory cues that are probably influenced by historically unregulated higher water flows in the spring of each year.

Water Quality

The potential to adversely impact water quality in the planning area is primarily a function of surface-disturbing activities and associated soil erosion, particularly on soils highly susceptible to water erosion. Actions removing vegetation and disturbing soil, thereby increasing the potential for offsite erosion and sediment delivery into the stream system, are primarily anticipated to be surface-disturbing activities. Appendix M provides data regarding surface disturbance acreage and reasonable foreseeable development actions by alternative. Other actions, including concentration of livestock, fire management and ecology, OHV use, and reclamation of disturbed areas are anticipated to also remove or reduce vegetation and disturb soil, but are expected to have less potential to degrade water quality in the North Platte watershed.

Under all alternatives, sedimentation entering watersheds is minimized through the implementation of BMPs and the development and implementation of an SWPPP and erosion and sediment control plans. In general, produced water from CBNG wells can result in higher volumes of water as compared with conventional natural gas wells and is relatively high quality in the planning area because it is derived from formations closer to the recharge areas. Negligible adverse impacts to surface water quality from CBNG development are anticipated under any alternative after implementation of BMPs and other mitigation measures. Please refer to the Water section earlier in this chapter for more information about potential impacts to surface water quality.

Water Quantity

Development of oil and gas wells can impact surface and groundwater quantity through water use associated with well drilling and completion, as well as through the surface discharge of produced water from CBNG wells. The amount of water used for drilling and completion of wells, including water for dust abatement and other post-drilling activities, is relatively similar for most types of wells. Water used for well construction and completion is assumed to reduce the amount of water available for use in the Platte River downstream of the planning area. The volume of produced water from CBNG wells impacting surface and groundwater quantity depends on the amount of water discharged into surface waters, reinjected, or discharged into impoundments. The contribution of produced water from CBNG wells is anticipated to be negligible compared to projected water depletions.

Projected development of water impoundments, springs, and wells for livestock, fish, and wildlife are anticipated to deplete water in the North Platte watershed. The number of impoundments, wells, and springs for livestock is the same under all alternatives. Table 4-10 summarizes the average annual depletion for each water-depleting action by alternative.

4.4.8.3 Conclusion

Alternative B has the least impact on water quality because it has the lowest levels of surface disturbance and the greatest protection for erodible soils among all the alternatives. According to projected surface disturbance (see Appendix M), alternatives A and D are anticipated to contribute the most sediment and the most runoff to surface water in the North Platte watershed and, therefore, have the most adverse impact on water quality.

Regarding water quantity, alternatives B and C have the greatest water depletion and, therefore, are likely to have the greatest adverse impact on the pallid sturgeon in the Platte River. As depicted in Table 4-10, these water depletions are heavily influenced by the Fish and Wildlife Water Impoundment evaporative loss. Anticipated adverse impacts to water quantity from Alternative A are anticipated to be the least (79 acre-feet), followed by Alternative E (270 acre-feet).

Table 4-10. BLM Actions and Potential Water Depletions in the North Platte Watershed During Implementation of the Casper Field Office Resource Management Plan

Alternative	Action[a]	Number	Average Annual Depletion (acre-feet)
A	Conventional Oil and Gas Drilling	279	28
	Livestock Water Impoundments[b]	12	51
	Livestock Water Wells and Springs	23	0
	Fish and Wildlife Water Impoundments[b]	0	0
	Total		**79**
B	Conventional Oil and Gas Drilling	34	3
	Livestock Water Impoundments[b]	12	51
	Livestock Water Wells and Springs	23	0
	Fish and Wildlife Water Impoundments[b]	92	1,960
	Total		**2,014**
C	Conventional Oil and Gas Drilling	234	23
	Livestock Water Impoundments[b]	12	51
	Livestock Water Wells and Springs	23	0
	Fish and Wildlife Water Impoundments[b]	46	980
	Total		**1,054**
D	Conventional Oil and Gas Drilling	285	29
	Livestock Water Impoundments[b]	12	51
	Livestock Water Wells and Springs	23	0
	Fish and Wildlife Water Impoundments[b]	9	192
	Total		**272**
E	Conventional Oil and Gas Drilling	268	27
	Livestock Water Impoundments[b]	12	51
	Livestock Water Wells and Springs	23	0
	Fish and Wildlife Water Impoundments[b]	9	192
	Total		**270**

[a]Due to the programmatic nature of RMP alternatives, key assumptions made for calculating projected water depletion in the North Platte watershed over the life of the RMP include the following:

(1) All wells, springs, and reservoirs projected for development over the life of the RMP are constructed and completed in year 1.

(2) Water depletions associated with conventional oil and gas drilling are calculated using an average depletion of 2 acre-feet per well occurring in the North Platte watershed by alternative. Oil and gas well numbers were derived from the Reasonable Foreseeable Develop Scenario for Oil and Gas (BLM 2005f).

(3) Livestock wells and reservoirs projected for grazing allotment Categories I and M (see Glossary) are included in water depletion calculations even when only a minor component of the allotment boundaries occurred in the North Platte watershed.

(4) Reservoir evaporative loss calculations are based on 45" annual pan evaporation, average pan coefficient of .70, and annual precipitation of 12.1" (based on a 30-year average of six recording stations) for the planning area.

(5) Potential water depletion for fire management is not included in calculations due to the nonpredictive nature of unplanned fire and the negligible water depletion associated with planned fire.

[b]Depletions associated with water impoundments are based on total acreage for each alternative.

4.4.9 Special Status Species – Wildlife

Actions that could occur through implementing each alternative could impact special status wildlife species. This section describes the impacts of each alternative on special status wildlife in terms of direct, indirect, short-term, and long-term impacts. Impacts also are described as beneficial or adverse to special status wildlife. Refer to Maps 26 through 30 for special status wildlife species and Map 20 and 21 for vegetation.

Direct impacts to special status wildlife result from the direct loss of critical habitat or a key habitat feature, such as a nest site or lek area, or from the immediate loss of life. Special status wildlife also can be directly disturbed by human activities, potentially causing them to abandon a nest, lek, or home range. It has been widely documented that disturbance during sensitive periods (e.g., winter, nesting) leads to lower recruitment rates and higher mortalities, which adversely impact special status species wildlife.

Habitat loss and fragmentation are assumed to adversely impact special status wildlife. These conditions are described in more detail in the introductions to Biological Resources in this chapter and in Chapter 3. Habitat loss generally is a direct impact; i.e., the individual or population is immediately impacted. The impacts of habitat fragmentation, however, operate indirectly through mechanisms, such as population isolation (Saunders et al. 1991); edge impacts, such as increased nest predation and parasitism (Paton 1994; Faaborg et al. 1995); encroachment of INPS; and disruption of migration patterns.

Indirect impacts to special status wildlife occur by changing habitat characteristics or quality, which can ultimately result in changes in migration patterns, habitat use, carrying capacity, and long-term population viability. Indirect impacts to habitats for special status wildlife also could occur when specific actions change the habitat in a way that makes it unsuitable for future habitation.

Disturbance impacts could range from short-term displacement and shifts in activities to long-term abandonment of home range (Miller 1998; Yarmaloy et al. 1988; Connelly et al. 2000). For the purpose of this analysis, short-term impacts (up to 5 years) to special status wildlife are those activities that an individual or species respond to immediately, but does not impact the population viability of the species. Long-term impacts (more than 5 years) are those that cause an individual or species to permanently abandon an area or that impact the population viability and survival of the species.

4.4.9.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Impacts to special status wildlife species are based primarily on potential impacts to habitats managed by the BLM.
- Precise quantitative estimates of impacts generally are not possible because the exact locations of future actions are unknown, population data for species status wildlife species are often lacking, or habitat types impacted by surface-disturbing activities cannot be predicted.
- Actions impacting one species have similar impacts on other species using the same habitats or areas.
- The more acreage of habitat protected, the greater the benefit to the targeted species.
- Prohibiting all disturbing and disruptive activities in greater sage-grouse winter habitats is more beneficial to greater sage-grouse than avoiding these activities.

- Management of sagebrush habitats follows the BLM National Sage-Grouse Habitat Conservation Strategy. Using these guidelines, greater sage-grouse serve as an umbrella species for all sagebrush-dependent species.
- Prescribed fire is used to manage vegetative communities and can result in short-term adverse impacts with long-term beneficial impacts to wildlife and wildlife habitats.
- Management toward DPC is assumed to exceed the requirements of managing toward DFC.
- Measures to protect one species generally will result in long-term benefits to other species occurring within that habitat.
- Short- and long-term surface disturbance (see Appendix M) are assumed to occur in vegetation types in proportion to the availability of these vegetation types in the planning area. Impact acreage for vegetation types are not absolute, but serve as a relative comparison among alternatives.
- Because of the migratory nature and relative mobility of some special status wildlife species (e.g., waterfowl, neotropical migrants, and raptors), these species are impacted by actions on non-BLM-administered land more so than other species. In the case of migratory species, impacts to winter and migration habitats could adversely impact the viability of some species. Winter and migration habitats are assumed to be at least as important to long-term viability of these species as breeding and nesting habitats.
- Interior least tern, Eskimo curlew, whooping crane, and piping plover occur along the Platte River in Nebraska, and could be impacted by management activities in the planning area. No direct impacts are expected to occur to habitats for these species as a result of activities in the planning area.
- The analysis of Platte River special status wildlife species focuses on changes in water quantity in the planning area as the primary indirect impact of resource management actions on Platte River species. Refer to the Special Status Species – Fish section for more details.

4.4.9.2 Analysis of Alternatives

The analysis of alternatives for special status wildlife species does not repeat the allowable uses and management actions proposed for each alternative and described in Chapter 2. Moreover, the types of impacts anticipated for special status wildlife species are similar in nature to the Impacts Common to All Alternatives described for Fish and Wildlife Resources – Wildlife; therefore, an extensive description of those impacts is not repeated in this section.

Impacts Common to All Alternatives

The types of impacts projected to occur to special status wildlife species as a result of the various alternatives are similar. Habitats are anticipated to be lost, degraded, reclaimed, protected, enhanced, and fragmented by management actions and allowable uses under all alternatives, although the intensity of impacts is anticipated to vary by alternative. Table 4-11 repeats Table 4-1's anticipated short- and long-term surface disturbance from BLM actions in the planning area over the life of the plan. RFAs contributing to this surface disturbance are identified in Appendix M.

Table 4-11. Reasonable Foreseeable Actions – Surface Disturbance (Acres) in the Casper Planning Area

Action	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Total Acres Short-Term Disturbance from BLM Actions	59,990	36,650	58,689	63,649	61,274
Total Acres Reclaimed from BLM Actions	38,903	25,085	38,331	41,569	39,602
Total Acres Long-Term Disturbance from BLM Actions	21,087	11,565	20,358	22,080	21,672

Source: Appendix M, Table M-1
BLM Bureau of Land Management

Surface-disturbing Activities. Because the precise location of surface-disturbing activities is unknown and because special status wildlife species utilize more than one vegetation type, impacts to special status wildlife from construction of well pads and roads, pits and reservoirs, pipelines and powerlines, mining, and vegetation treatments are anticipated to be a function of the amount, density, type, location, and frequency of short- and long-term disturbance. The timing and type of reclamation also is anticipated to impact special status wildlife species. Long-term surface disturbance acreage identified in Table 4-11 accounts for reclamation of some lands following short-term disturbance. Although reclamation restores habitat and thereby reduces long-term surface disturbance acreage, the location of permanent facilities (e.g., roads, well pads, etc.) adjacent to reclaimed areas can reduce the utility of reclaimed habitats. For example, the greater the density of permanent facilities in an area, the more the habitat is fragmented and the greater the adverse impact anticipated for wildlife. See the Fish and Wildlife Resources – Wildlife section for a more detailed description of surface-disturbing activities.

The bald eagle is a federally listed threatened species known to occur within the planning area. Currently, 5 bald eagle nests and 11 communal roosts have been documented within the planning area. Bald eagle habitats are described in detail in the Bald Eagle Habitat Management Plan (HMP) for the Platte River Resource Area and Jackson Canyon ACEC (BLM 1992a). As indicated in Chapter 2, Biological Resources, surface disturbance is prohibited within ¼ to 1 mile of known or discovered bald eagle nests. In addition, NSO or development are allowed around bald eagle communal roosts. All bald eagle roosts are withdrawn from locatable mineral entry (BLM 1992a).

Preble's meadow jumping mouse is a federally threatened species so the USFWS has designated critical habitat in riparian areas in Converse and Platte counties. Under all alternatives, any management actions in critical habitat that could affect habitat for Preble's meadow jumping mouse would be subject to Section 7 consultation with the USFWS. No measurable adverse impacts from the various alternatives' allowable uses and management actions have been identified for this species. Moreover, suitable habitat for this species primarily is found on private land in the eastern half of the planning area. However, actions resulting in the loss, degradation, or fragmentation of suitable riparian or wetland habitats could impact Preble's meadow jumping mouse, including, but not limited to, surface-disturbing activities, livestock grazing, fire, OHV use, and INPS. Due to existing protection for wetlands and the limited distribution of this species to southeast Wyoming, no impacts to this species are anticipated from any alternatives.

Wildlife-disturbing Activities. These are authorized activities that may cause displacement of or excessive stress to wildlife during critical life stages. Wildlife-disturbing activities include human presence, noise, and activities using motorized vehicles or equipment. Each of these activities is anticipated to occur under all alternatives and impact special status wildlife species. See the Fish and

Wildlife Resources – Wildlife section for a more detailed description of wildlife-disturbing activities. The precise location of wildlife-disturbing activities is not predictable at this level of analysis; therefore, these activities are evaluated during project-specific NEPA evaluations prior to project authorization.

Proactive Management Actions. Select management actions and allowable uses are anticipated to benefit special status wildlife species by promoting individual species and their habitats or by restricting activities of other resource programs (e.g., mining, livestock grazing, OHV use). Collectively, these actions are described in this section as proactive management actions and include managing vegetation communities and associated wildlife habitats; restricting certain types of development; establishing SMAs; managing habitat fragmentation; and developing and protecting water source and associated habitats. See the Fish and Wildlife Resources – Wildlife section for a more detailed description of proactive management actions.

All alternatives provide some degree of protection to streams, wells, springs, or other water sources by prohibiting or managing surface disturbance within varying distances from the water sources. Those alternatives providing the greatest protection of water sources beneficial to wildlife are anticipated to have the greatest benefit to wildlife. Special status wildlife species that use water sources and riparian and wetland habitats within the planning area benefit from management actions common to all alternatives that promote the development and enhancement of water sources. Development of water sources for wildlife and livestock are anticipated to benefit the distribution and health of special status wildlife species within the planning area.

All alternatives continue to manage public lands within the Table Mountain (1,549 acres), Springer/Bump-Sullivan (593 acres), and Rawhide (200 acres) areas in accordance to WGFD WMA plans, which have specific goals to benefit waterfowl and riparian and wetland habitats. Transfer of these areas to the WGFD under some alternatives is not anticipated to have measurable differences in impacts to special status wildlife species across alternatives. No federally listed species are known to occur in these areas.

Impacts to special status wildlife species generally are described in this section in terms of anticipated surface disturbance, amount of habitat potentially protected from habitat fragmentation, amount of land protected by buffers around nests and leks, amount of water depletion to the Platte River System, and the potential adverse impacts from other resource program actions. Table 4-12 summarizes select conservation measures anticipated to offset some of the impacts to habitats. In addition, Tables 4-5 and 4-6 summarize acreage by alternatives of lands restricted or closed to mineral development. These restrictions are anticipated to benefit special status species wildlife in the area.

Alternative A

Game Birds (Greater Sage-Grouse)

Estimated short- and long-term surface disturbance from BLM actions in the planning area are anticipated to result in loss, degradation, and fragmentation of sagebrush habitat (Table 4-1). Specifically, mineral and energy development has been identified as a potential cause of declining greater sage-grouse populations (Wyoming Sage-Grouse Working Group 2003). Alternative A does not provide specific guidance or management actions for the prevention of habitat loss and fragmentation. For example, developing minerals and wind-energy facilities on BLM-administered land under Alternative A could result in long-term adverse impacts to greater sage-grouse by fragmenting sagebrush habitats. Alternative A does not include restrictions for the development of wind energy. Reclamation of surface disturbance would be handled on a case-by-case basis under Alternative A without specific requirements regarding completion timeframe, topsoil salvage, seeding, certified weed-free seed, or temporary protective surface treatment requirements. For oil and gas activities, reclamation is completed in accordance to the surface

use plan. Overall, surface disturbance in sagebrush habitats under Alternative A is anticipated to adversely impact the greater sage-grouse.

Alternative A manages wildland fire on a case-by-case basis for areas where a management-ignited prescribed fire are planned. In addition, prescribed burning is implemented to manipulate vegetation on areas identified for treatment in the range, forestry, and wildlife programs. Rehabilitation and stabilization following wildland fire are conducted on a case-by-case basis. Nelle et al. (2000) concluded that burning did not benefit greater sage-grouse nesting or brood-rearing habitats and adversely impacted nesting habitats due to the extensive time it takes for sagebrush canopy to recover. Because greater sage-grouse hens show fidelity for nesting areas, catastrophic wildland fires that remove large tracts of sagebrush could be detrimental to greater sage-grouse populations (Wyoming Sage-Grouse Working Group 2003). Holloran et al. (2005) recommend limiting prescribed fire that may adversely impact dense sagebrush stands with adequate hebaceous vegetation. Fire management and ecology under Alternative A does not promote a natural fire regime and uses full suppression tactics across the entire planning area. The potential for catastrophic fire damaging important greater sage-grouse habitats under Alternative A is anticipated to have an adverse impact on the greater sage-grouse.

Currently, INPS management is handled primarily through the County Weed and Pest Program. However, in addition to the County Weed and Pest Program, livestock operators have formed 5 different Coordinated Resource Management groups to manage weeds on more localized levels. Despite these efforts, the spread of INPS is anticipated to degrade sagebrush habitats in the long term. Although the extent of sagebrush habitat degradation from the spread of INPS and other weeds is unknown for the planning area, the potential for these species to substantially impact greater sage-grouse habitats in the future exists (Wyoming Sage-Grouse Working Group 2003). Therefore, the anticipated continued expansion and spread of INPS under Alternative A is expected to adversely impact greater sage-grouse and sagebrush habitats.

By altering habitat components necessary for greater sage-grouse habitats, livestock grazing can impact the suitability and extent of greater sage-grouse habitats in the planning area (Wyoming Sage-Grouse Working Group 2003). Holloran et al. (2005) suggest that annual livestock grazing in greater sage-grouse nesting habitats may adversely impact the next year's nesting success. Under Alternative A, the BLM continues to manage livestock to prevent improper grazing in all allotments. The BLM currently monitors rangeland health on approximately 10 percent of grazing allotments annually, with an emphasis on higher-priority allotments (i.e., I and M allotments, see Glossary). Monitoring is important to ensure grazing intensity and duration does not remove required herbaceous cover and litter important for maintaining greater sage-grouse habitats. Adams et al. (2004) identify grazing intensity and timing and duration of grazing as the most important factors in maintaining herbaceous cover for greater sage-grouse. Although rangeland productivity is improving within the planning area, the current focus of management and monitoring does not emphasize the protective cover of vegetation and litter required by greater sage-grouse. Therefore, management of livestock grazing under Alternative A is not anticipated to improve the quality or quantity of habitat for the greater sage-grouse.

Under Alternative A, the BLM manages sagebrush habitats in the planning area to achieve DFC on a case-by-case basis. To minimize impacts to sagebrush habitats and the greater sage-grouse, Alternative A requires avoidance of surface disturbance or occupancy within ¼ mile of occupied leks and avoidance of surface-disturbing and disruptive activities within 2 miles of occupied leks or in identified greater sage-grouse nesting and early brood-rearing habitats outside the 2-mile buffer. Table 4-12 identifies the acreage protected by these buffers. Braun (2002) indicates that adverse impacts to greater sage-grouse can occur within ¼- or ½-mile buffers and accordingly recommends no surface disturbance within 3 miles of occupied leks. To protect greater sage-grouse winter habitats, surface disturbance and disruptive activities would be avoided from November 15 to March 14; however, greater sage-grouse winter habitats

have not been delineated in the planning area. Current special designations within the planning area include the Jackson Canyon and Salt Creek Hazardous Area ACECs. No special designations emphasizing the greater sage-grouse currently exist under Alternative A.

Table 4-12. Summary of Select Conservation Measures and Potential Habitat Impacts for Special Status Species – Wildlife

Actions Affecting SSS-Wildlife	Acreage Type	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Buffer Acres Around Raptor Nests	Total Area	82,938-157,220	82,940-270,914	82,940-270,913	82,940-257,625	82,940-257,625
	BLM-Administered Surface	82,938-123,622	64,572-213,876	64,572-213,875	64,572-204,177	64,572-204,177
Greater Sage-Grouse Leks Protective Buffers	BLM-Administered Surface	7,572	40,897	14,959	7,572	26,068
	BLM-Administered Minerals	17,474	89,210	31,561	17,474	51,841
Greater Sage-Grouse Nesting and Early Brood-Rearing Habitat Buffers	BLM-Administered Surface	345,533	788,774	400,445	345,533	435,981
	BLM-Administered Minerals	794,600	1,940,880	891,383	794,600	960,342
Acres Managed for Potential Black-footed Ferret Reintroduction	BLM-Administered Surface	N/A	145,641	145,641	CBC	CBC
Acres Protected from Habitat Fragmentation	Total Area	0	660,498	279,305	0	192,545
	BLM-Administered Surface	0	413,552	177,035	0	131,879
	BLM-Administered Minerals	0	580,007	238,724	0	168,386
Acres Protected from Habitat Fragmentation by Vegetation Types						
Agricultural Lands (Altered by Human)	Total Area	0	3	3	0	0
	BLM-Administered Surface	0	0	0	0	0
Desert Shrublands (Including Greasewood)	Total Area	0	137,327	18,252	0	5,115
	BLM-Administered Surface	0	83,675	9,652	0	2,902
Forests and Woodlands	Total Area	0	56,435	33,583	0	23,616
	BLM-Administered Surface	0	40,221	25,994	0	18,996
Grasslands	Total Area	0	175,000	85,552	0	64,302
	BLM-Administered Surface	0	109,692	52,589	0	40,032
Mountain Shrubland	Total Area	0	37,495	37,610	0	32,325
	BLM-Administered Surface	0	27,318	27,350	0	23,380
Riparian	Total Area	0	9,701	3,234	0	2,104
	BLM-Administered Surface	0	3,086	115	0	107
Rock Outcrops/Badlands	Total Area	0	3,087	3,095	0	2,001
	BLM-Administered Surface	0	2,962	2,967	0	1,952

Table 4-12. Summary of Select Conservation Measures and Potential Habitat Impacts for Special Status Species – Wildlife (Continued)

Actions Affecting SSS-Wildlife	Acreage Type	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Sagebrush	Total Area	0	241,450	97,976	0	63,082
	BLM-Administered Surface	0	146,598	58,418	0	44,510
Acres Managed for DFC or DPC for Aspen	BLM-Administered Surface	DFC 2,822	DPC 2,822	DPC 1,411	DPC 706	DPC 2,822
Acres Managed for DFC or DPC for Sagebrush	BLM-Administered Surface	DFC 630,183	DPC 630,183	DPC 315,902	DPC 157,546	DPC 630,183
Acres Managed for DFC or DPC for Mountain Shrub	BLM-Administered Surface	DFC 46,779	DPC 46,779	DPC 23,390	DPC 11,695	DPC 46,779
Acres of Salt Cedar Eradication	BLM-Administered Surface	N/A	1,700	1,275	850	Inventory and develop a Plan
Livestock Movement from INPS Infested Areas	BLM-Administered Surface	0	72 hours	72 hours	0	72 hours
Acreage Managed for DPC: Miles of Lotic/ Acres of Lentic Habitat	BLM-Administered Surface	PFC 350 /10,000	DPC 350 /10,000	DPC 175 /5,000	DPC 88 /2,500	DPC 350 /10,000
Incised Stream Miles/Lentic Habitat Restored	BLM-Administered Surface	N/A	108/90	75/47	33/43	Same as Alternative D
Acres of Proposed Surface Water for Fish and Wildlife	BLM-Administered Surface	1,500	2,500	2,000	1,600	1,600
Stream Miles of Improved Floodplain Connectivity	BLM-Administered Surface	N/A	350	108	75	75

BLM Bureau of Land Management
DFC Desired Future Condition
DPC Desired Plant Community
N/A Not Applicable
INPS Invasive Nonnative Plant Species
PFC Proper Functioning Condition
SSS Special Status Species (Wildlife)

Alternative A restrictions on surface disturbance or occupancy and disruptive activities around occupied greater sage-grouse leks are anticipated to provide some benefit to greater sage-grouse during sensitive periods; however, these restrictions may be insufficient to maintain or improve greater sage-grouse populations over the long term. In the long term, projected surface-disturbing and disruptive activities; management of fire, INPS, and livestock grazing; and existing proactive management actions under Alternative A may adversely impact the greater sage-grouse in the planning area.

Migratory Game Birds (Waterfowl)

Measurable impacts from surface-disturbing activities are not anticipated for migratory game birds (waterfowl) under Alternative A. Wildlife-disturbing activities such as fire management, OHV use, and livestock grazing activities sometimes occur in or near water, wetland, and riparian area habitats favored by waterfowl and, therefore, may adversely impact this category of special status wildlife species, particularly during sensitive periods (e.g., nesting). For example, livestock and wildlife tend to congregate at water sources, resulting in trampling of nests and vegetation and soil compaction around wetland and riparian areas. Under Alternative A, fencing of streams on BLM-administered land to exclude livestock and wildlife are evaluated on a case-by-case basis.

The spread of INPS is anticipated to degrade migratory game bird habitats in the planning area by displacing native vegetation, increasing soil erosion, and diminishing overall habitat quality. Through removal of vegetation, disturbance of soil, drought, and other factors (see INPS section earlier in this

chapter), INPS are anticipated to continue spreading in wetland and riparian areas in the planning area. Unabated, the continued spread of INPS is anticipated to degrade suitable habitats and may adversely impact migratory game birds.

No management actions are identified specifically for migratory game birds under Alternative A; however, these special status wildlife species are anticipated to be impacted (beneficially and adversely) by management actions and allowable uses included for other resources and resource uses. For example, under Alternative A, the BLM manages lotic and adjacent riparian habitats and lentic habitats toward PFC. The BLM does not construct any new fish and wildlife reservoirs, improve any stream floodplain connectivity, or restore incised streams under Alternative A. However, the BLM continues to manage an estimated 1,500 acres of water sources beneficial to waterfowl and to opportunistically pursue new water sources under Alternative A. The continued spread of INPS in the planning area could degrade these habitats.

Management of riparian habitats for PFC and continued management of 1,500 acres of water sources within the planning area are anticipated to maintain current riparian and wetland habitats and migratory game bird conditions within the planning area. However, in the long term, the continued spread of INPS in the planning area is expected to degrade water, riparian, and wetland habitats and, therefore, may adversely impact migratory game birds in the planning area.

Nongame (Raptors)

Nongame raptors are anticipated to be impacted by surface-disturbing activities resulting from mineral development, fire management, INPS, OHV use, livestock grazing, and management actions for biological resources under Alternative A. The late winter, spring, and early summer periods, when courtship, nest construction, incubation, and early brooding periods occur, are considered more sensitive to disturbance because adult nongame raptors are more prone to abandon nests at these times (USFWS 2002a). Constructing road, powerlines, and other development facilities can contribute to loss and fragmentation of raptor habitats and ultimately impact diversity and abundance of raptor populations (USFWS 2002a).

Surface disturbance will have localized adverse impacts on raptor prey species by temporarily and permanently disturbing habitats for small mammals and birds. Under Alternative A, surface disturbance impacts to raptors are minimized by designated buffer zones around raptor nests. Development infrastructure will also impact raptors. For example utility poles can provide perching and nesting structures for raptors, but can also result in mortality to raptors through collision and electrocution (APLIC and USFWS 2005). Under Alternative A, the BLM determines the size of buffer zones around raptor (excluding bald eagles) nests on a case-by-case basis from February 1 through July 31, although buffers would typically be ¼- to ½-mile wide. Including bald eagle nests, the BLM protects 82,938 to 123,622 acres surrounding raptor nests under Alternative A.

Wind-energy facilities can be a source of mortality for raptors if raptors collide with wind tower blades. High mortality could result if wind towers are placed along a migration path or within nesting territories. Raptors, other birds, and bats sometimes collide with tall wind energy and utility infrastructures, including guy wires used for stabilization. Wind-energy facilities also could result in habitat loss and fragmentation, as well as human disturbance from construction and maintenance activities. Alternative A does not contain specific restrictions for developing wind energy or preventing habitat fragmentation in the planning area.

Bald eagles can be adversely impacted by disturbance or habitat changes at important winter roosts; however, Alternative A establishes NSO buffers around all bald eagle roosts. Within the Jackson Canyon ACEC, silvicultural practices continue to be implemented to achieve healthy-aged and structured stands

for the benefit of bald eagle roosting. However, these stands would be removed from the commercial base. These management activities are expected to benefit the bald eagle by maintaining important roost sites.

Special status raptors are impacted by wildlife-disturbing activities that contribute to habitat loss, fragmentation, and degradation. Such actions include, but are not limited to, INPS control, OHV use, and livestock grazing. For example, the anticipated continued spread of INPS in the planning area is expected to degrade habitat for raptors and their prey over the long term. Fire is a useful tool for managing wildlife habitat; however, fire management under Alternative A is not specifically targeted to benefit raptors. Although improper livestock grazing can adversely impact habitat of raptors and their prey, Alternative A is anticipated to continue the upward trend of improving rangeland productivity and, therefore, not adversely impact raptors. Because special status raptors use a variety of habitats, general habitat impacts to raptors are similar to those discussed elsewhere in this section and in the vegetation sections and Fish and Wildlife Resources – Wildlife section. In the long term, the continued spread of INPS in the planning area, combined with the loss and fragmentation of raptor habitat by wind energy, mineral development, and associated infrastructure, are expected to degrade habitat important to raptors and their prey and, thus, may adversely impact these species over the life of the plan.

Nongame (Neotropical Migrants)

Many neotropical migrants breed and nest on BLM-administered lands and winter in the tropics (BLM 1992b). Although impacts to these species on their winter habitat are not subject to BLM management, impacts to breeding and nesting habitats from surface-disturbing activities, INPS control fire management and ecology, and management actions for biological resources on BLM-administered lands are anticipated for neotropical migrants. Surface disturbance is anticipated to have localized adverse impacts to breeding and nesting habitats for neotropical migrants. Habitat impacts from surface disturbance may include temporary and permanent loss of breeding and nesting habitats due primarily to mineral development. Fragmentation and degradation of habitat for neotropical migrants also is anticipated from surface-disturbing activities and associated development. For example, neotropical migrants are expected to be adversely impacted by wind-energy facilities, as discussed for special status raptors.

Because of the diverse and numerous species within the neotropical migrant category, additional impact analysis organizes these species into the following habitat guilds:

- Forest and Woodland Species – Lewis's woodpecker
- Sagebrush and Shrubland Species – Brewer's sparrow, loggerhead shrike, sage sparrow, and sage thrasher
- Grassland Species – Baird's sparrow, long-billed curlew, and mountain plover
- Riparian and Wetland Species – yellow-billed cuckoo, willow flycatcher, white-faced ibis, trumpeter swan, American white pelican, black-crowned night heron, snowy egret, Caspian tern, Forster's tern, black tern, and Franklin's gull
- Platte River Species – Eskimo curlew, interior least tern, piping plover, and whooping crane.

Forest and Woodland Species – The Lewis's woodpecker is the only special status neotropical migrant in this category. This species inhabits open ponderosa pine, juniper woodlands, and aspen communities, but can also be found in cottonwood riparian habitats (see analysis for riparian and wetland species). Under Alternative A, forests are managed primarily for forest products and stand vigor. Bock et al. (1992) identified the Lewis's woodpecker as a species that responds positively to livestock grazing. In addition, Alternative A manages aspen and other woodland stands in the planning area to achieve DFC. In the

long-term, actions and allowable uses implemented under Alternative A are not expected to adversely impact populations of forest and woodland neotropical migrants.

Sagebrush and Shrubland Species – Similar to the greater sage-grouse, Brewer's sparrow, sage sparrow, and sage thrasher depend on sagebrush habitats. These species may use other shrubland types, particularly during the nonbreeding season. The loggerhead shrike uses more of a diversity of shrubland types, including sagebrush. Therefore, measures to protect greater sage-grouse as discussed under Game Birds (greater sage-grouse) would benefit all sagebrush and shrubland species. Adverse impacts to sagebrush habitat, as discussed for the greater sage-grouse, adversely impact these species. On the other hand, sagebrush and shrubland species may benefit from management actions in mountain shrub communities. For example, Alternative A manages mountain shrub communities to achieve DFC. In the long term, actions and allowable uses implemented under Alternative A are expected to benefit forest and woodland neotropical migrants within buffer areas established for the greater sage-grouse.

Grassland Species – Under Alternative A, there are no specific management actions for special status neotropical migrants that utilize grasslands. These species would be impacted by actions in grassland habitats, such as surface-disturbing activities, INPS control, fire management, OHV use, and livestock and wildlife grazing. Under Alternative A, short- and long-term surface disturbance to grassland habitats on BLM-administered land in the planning area is expected. Another grassland species, mountain plover, is often found in association with prairie dog towns because they tend to prefer nesting areas with sparse vegetation cover. The long-billed curlew also nests in areas with sparse vegetation. Therefore, these species would also be impacted by management actions for black-tailed and white-tailed prairie dogs (see Nongame [Mammals] section).

Riparian and Wetland Species – Although there are no specific management actions for special status neotropical migrants that use riparian and wetlands, these species are impacted by other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats. Riparian and wetland areas also provide late brood-rearing habitats for greater sage-grouse; breeding and migratory stopover habitats for sensitive songbirds, waterbirds, shorebirds, and waterfowl; and breeding, foraging, and wintering habitat for bald eagles. Management and potential impacts to riparian and wetland species under Alternative A are anticipated to be similar to those described for migratory game birds (waterfowl).

Platte River Species – Potential impacts to Platte River species would primarily result from water-depleting actions in the North Platte watershed. See the Special Status Species – Fish section for more discussion of water depletion and its impacts to Platte River species. Because Platte River species depend on Platte River habitats and because historical water depletions have impacted these species, projected water depletions from BLM actions in the North Platte watershed may adversely impact the Eskimo curlew, interior least tern, piping plover, and whooping crane.

Nongame (Mammals)

Impacts from surface-disturbing activities, INPS, fire management and ecology, and management actions for biological resources are anticipated for special status nongame mammals. Surface disturbance is anticipated to have localized adverse impacts to special status nongame mammal habitats including temporary and permanent loss of habitats. Fragmentation and degradation of habitats for special status nongame mammals is also anticipated from surface-disturbing activities and associated development.

It is important to note that some special status nongame mammal species, especially bats, may use more than one habitat type. However, because of the diverse and numerous species within the special status nongame mammal category, the impact analysis organizes these species into the following habitat guilds:

- Forest and Woodland Species – spotted bat, eastern red bat, hoary bat, and silver-haired bat
- Sagebrush and Shrubland Species – white-tailed prairie dog, big brown bat, pallid bat, olive-backed pocket mouse, silky pocket mouse, hispid pocket mouse, prairie vole, sagebrush vole, and plains pocket gopher
- Grassland Species – black-tailed prairie dog, black-footed ferret, and plains harvest mouse
- Riparian and Wetland Species – Preble's meadow jumping mouse
- Cave Species – Townsend's big-eared bat, long-eared myotis, fringed myotis, western small-footed myotis, little brown myotis, and long-legged myotis.

Forest and Woodland Species – These species use forests, woodlands, and habitat edges for foraging and typically roost in snags and crevices under tree bark. No specific management actions for bats for any alternatives exist, nor have bat habitats been delineated in the planning area. In general, forest and woodland special status nongame mammal species occupy similar habitats as forest and woodlands special status nongame neotropical migrants and, thus, impacts to the two groups may be similar. Potential impacts from forest management and fire are anticipated to be the primary cause of impacts to forest and woodland species. Forest management under Alternative A focuses on timber management and stand vigor. In the long term, these actions are not expected to adversely impact populations of special status nongame mammals occupying forests and woodlands in the planning area.

Sagebrush and Shrubland Species – Similar to the greater sage-grouse, special status nongame mammals in this category depend on sagebrush habitats or other shrubland types. Therefore, measures to protect greater sage-grouse as discussed under Game Birds (greater sage-grouse) are anticipated to benefit all sagebrush and shrubland species. Likewise, adverse impacts to sagebrush habitats, as discussed for the greater sage-grouse, would also adversely impact these species. Sagebrush and shrubland mammal species may also benefit from management actions in mountain shrub communities. Under Alternative A, the BLM manages 46,779 acres of mountain shrub communities for DFC. In the long-term, actions implemented under Alternative A are expected to benefit special status nongame mammals occupying sagebrush habitats within designated greater sage-grouse lek habitat buffers.

Grassland Species – These species are impacted by actions in grassland habitat, such as surface-disturbing activities, reclamation, INPS control, and livestock grazing. Under Alternative A, short- and long-term surface disturbance is expected for grassland habitats on BLM-administered land in the planning area. Seglund et al. (2004) suggest that livestock grazing has adversely impacted the range of the white-tailed prairie dog. Prairie dog control (i.e., poisoning or other APHIS-approved control methods) are allowed only when an adjacent landowner submits a written request and only where the distance to private land is less than ½ mile. Reductions in prairie dog populations may affect other grassland species associated with prairie dog towns, including mountain plover, burrowing owl, swift fox, and black-footed ferret. Because most suitable habitats for prairie dogs are located on private and state land in the planning area, measurable adverse impacts to prairie dog populations are not anticipated by BLM actions under Alternative A.

Riparian and Wetland Species – The Preble's meadow jumping mouse is the only species in this category. Management actions potentially impacting this species or its designated critical habitat for this species are described in the Impacts Common to All Alternatives section.

Cave Species – Bats that use caves for roosting, maternity colonies, or hibernation could be impacted by surface-disturbing activities near caves, cliffs, or other rock features. Caves, cliffs, and rock outcrops are often found in steep terrain; the BLM limits surface-disturbing activities on slopes greater than 25 percent under Alternative A. Therefore, most cave habitats are expected to be protected under Alternative A;

however, all special status bats could be adversely impacted by wind-energy facilities, as discussed for special status raptors.

Nongame (Amphibians)

The northern leopard frog is the only special status amphibian in the planning area. This species uses riparian and wetland habitats; therefore, impacts to the northern leopard frog are similar to those described for special status waterfowl using riparian and wetland habitats.

Alternative B

Game Birds (Greater Sage-Grouse)

Under Alternative B, estimated short- and long-term surface disturbance from BLM actions in the planning area are anticipated to result in less loss, degradation, and fragmentation of sagebrush habitats than under Alternative A. In addition, Alternative B includes specific management actions for protection from habitat fragmentation (including sagebrush habitats) on BLM-administered surface and federal mineral estate. Oil and gas and wind-energy development are precluded in areas protected from habitat fragmentation under Alternative B. Developing wind-energy facilities on BLM-administered land is restricted to outstanding/superb power classes (see Table 3-26) under Alternative B, thereby reducing the potential to fragmenting sagebrush habitats (Table 4-12). Two known greater sage-grouse leks occur on BLM-administered land in areas rated as outstanding/superb wind-energy power classes (see Table 3-26).

Reclamation of surface disturbance under Alternative B includes requirements for completion within one growing season; topsoil salvage and segregation; seeding with native, certified weed-free native species' seed; and temporary protective surface treatment. Although surface disturbance results in short-term habitat loss and damage, the reclamation requirements of Alternative B help maintain long-term habitat quality in all habitat types, including sagebrush. Overall, because surface disturbance and habitat loss, degradation, and fragmentation are less under Alternative B than under Alternative A, the associated adverse impacts to greater sage-grouse habitats also are expected to be less.

Alternative B restores a natural fire regime in the planning area and uses prescribed fire to achieve measurable landscape-level objectives. In addition, Alternative B does not allow heavy equipment around leks, thereby minimizing impacts to habitat quality. Use of a natural fire regime in fire-adapted ecosystems and reduction in fuel loads in the planning area may reduce the potential for catastrophic fire, potentially impacting greater sage-grouse nesting habitats adversely. Therefore, Alternative B is anticipated to benefit the greater sage-grouse.

Alternative B seeks to minimize adverse impacts to sagebrush and other habitats from the spread of INPS by implementing comprehensive weed management plans throughout the planning area. In addition, livestock could be held for 72 hours prior to moving onto and within public lands to control the spread of INPS. These management actions are anticipated to control the spread of INPS more effectively compared to Alternative A. Greater control of INPS under Alternative B is anticipated to protect sagebrush habitats and, therefore, benefit greater sage-grouse more than under Alternative A.

OHV use under Alternative B is more restrictive compared to Alternative A and the most restrictive compared to other Action Alternatives (see Appendix M). Restrictions to OHV use under Alternative B are anticipated to result in fewer potential impacts (wildlife disturbing) to the greater sage-grouse compared to Alternative A.

Under Alternative B, the BLM monitors all grazing allotments annually. In addition, Alternative B limits forage utilization to 40 percent of current growing season production. The restrictions to forage

utilization and complete monitoring of all allotments under Alternative B are anticipated to benefit greater sage-grouse by increasing the quantity and quality of herbaceous plant species.

Under Alternative B, the BLM manages the sagebrush habitats it administers to achieve DPC. To minimize impacts to sagebrush habitats and the greater sage-grouse, Alternative B requires greater avoidance of surface disturbance or occupancy to protect associated nesting and early brood-rearing habitats compared to Alternative A. Specifically, Alternative B requires larger buffers around leks (½-mile NSO restriction) and nesting and early brood-rearing habitats (4-mile TLS) on BLM-administered surface and federal mineral estate compared to Alternative A. The larger buffer is similar to the recommendations by Braun (2002). Alternative B protects greater sage-grouse winter habitats during similar timeframes as Alternative A; however, Alternative B implements an additional goal within the Bates Hole and Fish Creek/Willow Creek areas to avoid surface disturbance in sagebrush stands that provide winter habitats, particularly those areas with greater than 20 percent canopy cover. Alternative B establishes the Bates Hole SMA with an emphasis on greater sage-grouse and watershed values. Within the boundaries of the Bates Hole SMA, the protective buffers lek ¾-mile NSO restriction, greater sage grouse nesting 4-mile NSO restriction) are even more restrictive than those areas outside the SMA boundary.

In the long term, the larger protective buffers restricting surface disturbance or occupancy around greater sage-grouse leks, combined with the proactive management actions establishing the Bates Hole SMA, are anticipated to protect sagebrush habitats. Under Alternative B, these restrictions and proactive management actions could benefit greater sage-grouse to a greater extent than under Alternative A.

Migratory Game Birds (Waterfowl)

Measurable impacts from surface-disturbing activities, fire management, OHV use, INPS control, and livestock grazing activities under Alternative B are anticipated to adversely impact migratory game birds the least of all alternatives. Under Alternative B, all existing wells and multi-use reservoirs are fenced on BLM-administered land. Moreover, Alternative B requires a CSU restriction from 500 feet to ¼ mile of all perennial streams, wetlands, riparian areas, and water bodies. Alternative B also institutes a comprehensive management approach for controlling INPS and targets eradication of 1,700 acres of salt cedar, a species often occurring in wetland and riparian areas. Overall, Alternative B's restrictions and proactive management actions are anticipated to protect and enhance water, wetland, and riparian habitats to the waterfowls' benefit.

Alternative B continues to manage the Table Mountain, Springer/Bump-Sullivan, and Rawhide areas in accordance to WGFD WMA plans; however, a protective withdrawal would be established under Alternative B segregating 2,201 acres from operation of the public land laws, including mining laws. Alternative B manages the same amount of riparian as Alternative A, but under DPC instead of PFC. Alternative B also constructs the most new fish and wildlife reservoirs (1,000 acres), improves floodplain connectivity along the 350 stream miles, and restores 108 miles of incised streams. The withdrawals, new reservoirs, habitat restoration, and management toward DPC are anticipated to protect, enhance, and restore waterfowl habitats and, thus, benefit waterfowl more than under Alternative A.

Nongame (Raptors)

Surface-disturbing activities, fire management, INPS control, OHV use, livestock grazing, and management actions for biological resources are anticipated to impact raptors less under Alternative B than under Alternative A. Compared to Alternative A, restrictions around raptor nests are more extensive in time and area under Alternative B; therefore, resulting in fewer direct impacts to nesting raptors. Buffers around all raptor nests would be ½ -mile wide, except restrictions around ferruginous hawk nests would apply within 1 mile. Including bald eagle nests (see Impacts Common to All Alternatives),

Alternative B protects more BLM-administered surface surrounding raptor nests compared to Alternative A.

The development of wind-energy facilities on BLM-administered land is restricted to outstanding/superb power classes (see Table 3-26) under Alternative B, thereby reducing the potential to fragment sagebrush habitats compared to Alternative A. Approximately 21 raptor nests and 4 bald eagle roosts occur on BLM-administered land rated as outstanding/superb power classes. Overall, the restrictions to wind-energy development, surface-disturbing activities, fire suppression, livestock grazing, OHV use, and INPS control under Alternative B are anticipated to protect more raptor habitats compared to Alternative A.

Alternative B is anticipated to continue the trend of improving rangeland productivity and slowing the spread of INPS more than Alternative A. These actions and increased restrictions on OHV use in the planning area are anticipated to protect and enhance more raptor habitats compared to Alternative A.

Nongame (Neotropical Migrants)

Under Alternative B, short- and long-term surface disturbance are anticipated to be less; therefore, associated adverse impacts to breeding and nesting habitats for neotropical migrants are anticipated to be less compared to Alternative A. Impacts to neotropical migrants from wind-energy development also are anticipated to be less under Alternative B than under Alternative A due to limiting wind-energy development to outstanding/superb power classes (see Table 3-26).

Because of the diverse and numerous species within the neotropical migrant category, the impact analysis organizes these species into the following habitat guilds:

Forest and Woodland Species – Compared to Alternative A, specific management actions under Alternative B are aimed at maintaining open forest and woodlands stands to benefit wildlife. Management actions that promote open, old-growth characteristics benefit the Lewis's woodpecker. For example, ponderosa pine stands are managed for old growth (including snags) in Little Red Creek, Esterbrook, and Jackson Canyon under Alternative B. Relative to Alternative A, Alternative B places increased importance on the value of aspen communities by managing these communities toward DPC.

Sagebrush and Shrubland Species – Measures to protect and reduce potentially adverse impacts to greater sage-grouse, as discussed under Game Birds (greater sage-grouse), benefit special status sagebrush and shrubland species. Sagebrush and shrubland species also may benefit from management actions in mountain shrub communities. Relative to Alternative A, Alternative B places an increased importance on mountain shrub communities by managing toward DPC.

Grassland Species – Although no specific management actions are identified under Alternative B for special status neotropical migrants utilizing grasslands, these species benefit by management actions treating woodland encroachment into grassland habitats where it is detrimental to grassland species. Grassland special status neotropical migrant species are impacted by actions in grassland habitats, such as surface-disturbing activities, reclamation, INPS control, and livestock and wildlife grazing. Under Alternative B, less grassland habitat is expected to be impacted by BLM actions compared to Alternative A. Moreover, management actions under Alternative B are anticipated to protect more grassland and other vegetation types from habitat fragmentation compared to Alternative A. The mountain plover and long-billed curlew nest in areas with sparse vegetation and are anticipated to be impacted by management actions for black-tailed and white-tailed prairie dogs (see Nongame [Mammals]).

Riparian and Wetland Species – Although no specific management actions for special status neotropical migrants utilizing riparian and wetlands are identified under Alternative B, these species are expected to

be impacted by other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats. Riparian and wetland areas provide late brood-rearing habitats for greater sage-grouse; breeding and migratory stopover habitats for sensitive songbirds, waterbirds, shorebirds, and waterfowl; and breeding, foraging, and wintering habitats for bald eagles. Management and potential impacts to riparian and wetland species under Alternative B are anticipated to be similar to those described for migratory game birds (waterfowl) but less than under Alternative A.

Under Alternative B, managing livestock grazing and wetland and riparian areas could include fencing, developing alternative water supplies for livestock, herding, placing feed and mineral supplements away from water sources, and adjusting to pasture boundaries and season of use. Furthermore, Alternative B does not allow surface-disturbing activities and heavy equipment on wet soils. These actions would ultimately result in a riparian system with increased vegetation and structural diversity, leading to an increase in abundance and diversity of neotropical migrants.

Platte River Species – Construction of reservoirs, pits, springs, and wells are anticipated to deplete the most water annually under Alternative B compared to other alternatives. See the Special Status Species – Fish, Table 4-10 for Platte River depletion calculations. Because Platte River species depend on Platte River habitats and because historical water depletions have impacted these species, projected water depletions from BLM actions in the North Platte watershed may adversely impact the Eskimo curlew, interior least tern, piping plover, and whooping crane.

Overall, the management of habitat for DPC, restrictions on wind-energy development, less surface disturbance, and managing INPS control, OHV use, and livestock grazing under Alternative B are anticipated to protect and enhance more habitat and, thus, benefit special status neotropical migrants within the planning area more than Alternative A. Conversely, potential adverse impacts to the Platte River species downstream of the planning area are anticipated to be the most under Alternative B, primarily due to the highest predicted annual average water depletion.

Nongame (Mammals)

Impacts from surface-disturbing activities, INPS control, fire management and ecology, OHV use, livestock grazing, and management actions for biological resources under Alternative B are anticipated to be less for special status nongame mammals compared to Alternative A.

Forest and Woodland Species – In general, forest and woodland special status nongame mammal species occupy similar habitats as forest and woodland special status nongame neotropical migrants and, thus, impacts to the two groups may be similar. Forest management under Alternative B emphasizes watershed stability, wildlife habitats, and recreation, and would try to maximize opportunities to improve forest diversity, species vitality, and genetic diversity. Compared to Alternative A, forest management under Alternative B is anticipated to protect and enhance more forest and woodland habitats to benefit special status nongame mammals.

Sagebrush and Shrubland Species – Sagebrush and shrubland special status nongame mammal species are anticipated to benefit from management actions in sagebrush and mountain shrub communities. Alternative B manages more sagebrush and more mountain shrub communities toward DPC than Alternative A, thereby providing a greater benefit to special status nongame mammals compared to Alternative A. Potential impacts to white-tailed prairie dogs are similar to those for black-tailed prairie dogs described under Grassland Species, below.

Grassland Species – Similar to Alternative A, grassland species are impacted by actions in grassland habitats, such as surface-disturbing activities, reclamation, INPS control, fire management, and livestock and wildlife grazing. However, under Alternative B, less grassland habitat is impacted by short- and

long-term surface disturbance compared to Alternative A. Less surface disturbance and less habitat fragmentation under Alternative B are anticipated to benefit special status nongame mammal species more than under Alternative A.

Alternative B designates a black-tailed prairie dog ACEC on approximately 22,937 acres (3,103 and 14,846 acres, respectively, on BLM-administered surface and federal mineral estate). The goal of this ACEC is to ensure a long-term, self-sustaining population of prairie dogs in the planning area. Furthermore, under Alternative B, shooting prairie dogs is not permitted on all public surface lands within the planning area. Prairie dog control is not allowed, except for human health and safety reasons. Alternative B manages 145,641 acres of public land for potential reintroduction of black-footed ferrets, which would also benefit other special status grassland species. The associated potential increases in prairie dog populations under Alternative B are anticipated to benefit species associated with prairie dog towns, including mountain plover, burrowing owl, swift fox, and black-footed ferret more so than under Alternative A.

Riparian and Wetland Species – The Preble's meadow jumping mouse is the only species in this category. Management actions that could affect this species or designated critical habitat for this species are described in the Impacts Common to All Alternatives section.

Cave Species – Bats using caves for roosting, maternity colonies, or hibernation could be affected by surface-disturbing activities near caves, cliffs, or other rock features. Caves, cliffs, and rock outcrops are often found in steep terrain; the BLM limits surface-disturbing activities on slopes greater than 25 percent under Alternative B. Therefore, most cave habitats are expected to be protected under Alternative B; however, all special status bats could be adversely impacted by wind-energy facilities, as discussed for special status raptors.

Nongame (Amphibians)

Potential impacts to the northern leopard frog are commensurate with impacts to riparian and wetland habitats. The impacts under Alternative B are anticipated to be similar to those described for special status neotropical migrants that use riparian and wetland habitats and less than under Alternative A.

Alternative C

Game Birds (Greater Sage-Grouse)

Estimated short- and long-term surface disturbance from BLM actions under Alternative C are approximately 3 and 4-percent less, respectively, compared to Alternative A (Table 4-11). Disturbance to sagebrush habitats is also anticipated to be less compared to Alternative A. To avoid or minimize the impacts of habitat fragmentation, Alternative C protects 8 blocks of land from habitat fragmentation, substantially more than Alternative A (Table 4-12). Developing wind-energy facilities on BLM-administered surface would be allowed on outstanding/superb and good/excellent power classes (see Table 3-26) under Alternative C, on less acreage than under Alternative A, however. Nineteen greater sage-grouse leks are known to occur on BLM-administered land designated within these power classes. Greater sage-grouse lek and nesting and early-brood rearing buffers apply.

Reclamation requirements under Alternative C are more restrictive than Alternative A, including a three growing season timeframe, limited topsoil salvage, certified weed-free seeding, and temporary protective surface treatment requirements. Overall, because surface disturbance and habitat loss, degradation, and fragmentation are less under Alternative C compared to Alternative A, the associated adverse impacts to greater sage-grouse also are expected to be less.

Alternative C restores a natural fire regime to fire-adapted ecosystems in the planning area and uses prescribed fire to achieve measurable landscape-level objectives. In addition, Alternative C does not allow heavy equipment around leks, thereby minimizing impacts to habitat quality. Embracing a natural fire regime in fire-adapted ecosystems and managing fuel loads under Alternative C are anticipated to lower the risk of catastrophic fire, which could adversely impact greater sage-grouse nesting habitats more than under Alternative A.

Alternative C seeks to minimize adverse impacts to sagebrush and other habitats from the spread of INPS by implementing a comprehensive weed management plan. In addition, the BLM's authorized officer could require a 72-hour holding period for livestock prior to movement onto or within public lands under Alternative C. Developing and implementing a weed management plan is anticipated to slow the spread of INPS in the planning area, thereby benefiting greater sage-grouse habitats to a greater extent than Alternative A.

OHV use under Alternative C is more restrictive compared to Alternative A. Restrictions to OHV use under Alternative C are anticipated to result in fewer potential impacts (human disturbance and habitat degradation) to greater sage-grouse compared to Alternative A.

Under Alternative C, the BLM manages livestock grazing to maintain a protective cover of vegetation and litter with emphasis on the condition of allotments with substantial acreage of highly erosive soils and high priority allotments (categories I and M, see Glossary). Additional litter in sagebrush habitats under Alternative C is expected to provide greater benefits to greater sage-grouse compared to Alternative A.

Under Alternative C, BLM manages 315,902 acres of sagebrush habitat toward DPC and the same acreage toward DFC, thereby improving sagebrush habitats compared to Alternative A. Alternative C protects lek habitats more compared to Alternative A, but less than Alternative B. Alternative C protects the same amount of nesting and early brood-rearing habitats on BLM-administered surface and federal mineral estate as Alternative A. Similar to Alternative A, greater sage-grouse winter habitats are protected from surface disturbance and disruptive activities from November 15 to March 14. However, Alternative C avoids surface disturbance in sagebrush stands in the Bates Hole and Fish Creek/Willow Creek areas that provide winter habitats, particularly those areas with greater than 20 percent canopy cover. No additional special designations are designated under Alternative C for the greater sage-grouse.

Restrictions on surface disturbance or occupancy proposed by Alternative C are anticipated to benefit greater sage-grouse during the sensitive nesting and wintering periods and in sensitive habitats such as leks. Less proposed surface disturbance, more lek buffer acreage protected, more acreage protected from habitat fragmentation, and generally more restrictive management actions regarding surface disturbance, reclamation, and resource uses within the planning area under Alternative C are expected to have less adverse and more beneficial impacts to greater sage-grouse compared to Alternative A.

Migratory Game Birds (Waterfowl)

Impacts from surface-disturbing activities, OHV use, INPS control, and livestock grazing activities could adversely impact special status waterfowl less under Alternative C than under Alternative A. Under Alternative C, all existing wells and multi-use reservoirs constructed after 1995 are fenced on BLM-administered land. Moreover, Alternative C requires a CSU restriction from 500 feet to ¼ mile of all Class 1 (see Glossary), perennial streams, wetlands, riparian areas, and water bodies. Alternative C identifies more salt cedar acres for eradication compared to Alternative A. Salt cedar often occurs in wetland and riparian areas used by special status waterfowl. Overall, Alternative C's restrictions and proactive management actions could protect and enhance water, wetland, and riparian habitats to the benefit of special status waterfowl to a greater extent compared to Alternative A.

Alternative C continues the Table Mountain, Springer/Bump-Sullivan, and Rawhide HMPs as described for Alternative A; however, these lands are disposed to the WGFD within 5 years. Alternative C manages more lotic and adjacent riparian habitats and more lentic habitats for DPC compared to Alternative A. Alternative C also constructs more new fish and wildlife reservoirs, improves floodplain connectivity on more stream miles, and restores more miles of incised streams compared to Alternative A. The new reservoirs, habitat restoration, and management toward DPC under Alternative C are all anticipated to protect, enhance, and restore waterfowl habitats and, thus, benefit special status waterfowl more than under Alternative A.

Nongame (Raptors)

Surface-disturbing activities, fire management, INPS control, OHV use, livestock grazing, and management actions for biological resources are anticipated to impact special status raptors less under Alternative C than under Alternative A. Compared to Alternative A, restrictions around raptor nests would be more extensive, thereby benefiting nesting special status raptors more under Alternative C.

The development of wind-energy facilities on BLM-administered land is restricted to outstanding/superb and good/excellent power classes (see Table 3-26) under Alternative C, thereby reducing the potential of fragmenting sagebrush habitats compared to Alternative A. Approximately 461 raptor nests and 13 bald eagle roosts are known to occur on BLM-administered land within the power classes open to wind-energy development under Alternative C. Without proper siting, Alternative C could adversely impact special status raptors species similar to Alternative A. The restrictions to surface-disturbing activities, fire suppression, livestock grazing, OHV use, and INPS control under Alternative C are anticipated to protect more special status raptor habitats compared to Alternative A.

All bald eagle roosts are protected by buffers as discussed under Impacts Common to All Alternatives. To further protect bald eagle roosts, no heavy equipment and no tree cutting is allowed around roosts during fire suppression under Alternative C. In the Jackson Canyon ACEC, forest management activities and prescribed burning are allowed to meet bald eagle management objectives, but would be limited to existing roads and trails and not occur during the roosting period under Alternative C.

Alternative C is anticipated to continue the upward trend of improving rangeland productivity, slow the spread of INPS, and increase restrictions on OHV use in the planning area more so than compared to Alternative A. These actions could protect and enhance more special status raptor habitats under Alternative C compared to Alternative A.

Nongame (Neotropical Migrants)

Under Alternative C, short- and long-term surface disturbance are anticipated to be less; therefore, associated adverse impacts to breeding and nesting habitats for special status neotropical migrants are anticipated to be less compared to Alternative A. Because wind-energy development is limited compared to Alternative A, impacts to special status neotropical migrants from wind-energy development under Alternative C are anticipated to be less.

Because of the diverse and numerous species within the neotropical migrant category, the impact analysis organizes these species into the following habitat guilds:

Forest and Woodland Species – Under Alternative C, no specific management actions aimed at maintaining open forest and woodlands stands to benefit wildlife; rather, the goal is to maintain sustainable flow of wood products. Selected wildlife snags are retained in Little Red Creek, Jackson Canyon, and Esterbrook. Relative to Alternative A, Alternative C places increased importance on the

value of aspen communities by managing aspen toward DPC. Overall, there are few management actions that would specifically benefit the Lewis's woodpecker.

Sagebrush and Shrubland Species – Measures to protect and reduce potential adverse impacts to greater sage-grouse, as discussed under Game Birds (greater sage-grouse), will benefit all sagebrush and shrubland species. Sagebrush and shrubland species also may benefit from management actions in mountain shrub communities. Relative to Alternative A, Alternative C places an increased importance on mountain shrub communities by managing toward DPC.

Grassland Species – Although no specific management actions for special status neotropical migrants that utilize grasslands are identified under Alternative C, these species are expected to benefit by management actions that treat woodland encroachment into grassland habitats where it is detrimental to grassland species. Grassland special status neotropical migrant species are expected to be impacted by actions in grassland habitat, such as surface-disturbing activities, reclamation, INPS control, and livestock grazing. Alternative C impacts less and protects more grassland habitat from fragmentation compared to Alternative A. The mountain plover is often found in association with prairie dog towns. The mountain plover tends to prefer nesting areas with sparse vegetation cover. The long-billed curlew also nests in areas with sparse vegetation. Therefore, these species are also impacted by management actions for black-tailed and white-tailed prairie dogs (discussed under Nongame [Mammals]) under Alternative C.

Riparian and Wetland Species – Although no specific management actions for special status neotropical migrants utilizing riparian areas and wetlands are identified under Alternative C, these species are expected to be impacted by other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats. Compared to Alternative A, Alternative C manages more lotic and adjacent riparian habitat and lentic habitat toward DPC; develops more reservoirs of surface water, possibly increasing habitat for special status neotropical migrants; improves more habitat and water quality; improves floodplain connectivity and function on more miles of stream; and restores more miles of incised streams. Management of and potential impacts to riparian and wetland species under Alternative C are anticipated to benefit migratory game birds (waterfowl) more than under Alternative A.

Under Alternative C, management of livestock grazing could include fencing, developing alternative water supplies for livestock, herding, placing feed and mineral supplements away from water sources, and adjusting to pasture boundaries and season of use. These actions apply only to streams on BLM-administered lands rated as nonfunctional or functional at-risk. Furthermore, Alternative C does not allow surface-disturbing activities and heavy equipment on wet soils. These actions are anticipated to ultimately result in a riparian system with improved vegetation and structural diversity, leading to a potential increase in abundance and diversity of special status neotropical migrants.

Platte River Species – Construction of reservoirs, pits, springs, and wells are anticipated to deplete approximately 1,054 acre-feet of water annually under Alternative C, more than under Alternative A. See the Special Status Species – Fish, Table 4-10 for Platte River depletion calculations. Because Platte River species depend on Platte River habitat and because historical water depletions have impacted these species, projected water depletions from BLM actions in the North Platte watershed may adversely impact the Eskimo curlew, interior least tern, piping plover, and whooping crane.

Overall, the management of habitat toward DPC, less surface disturbance, and management of INPS, OHV use, and livestock grazing under Alternative C are anticipated to protect and enhance more habitat and, thus, benefit special status neotropical migrants within the planning area more compared to Alternative A. Conversely, potential impacts to the Platte River neotropical migrants, downstream of the planning area, are anticipated to be higher under Alternative C compared to Alternative A, primarily due to higher predicted annual average water depletion.

Nongame (Mammals)

Impacts from surface-disturbing activities, INPS control, fire management and ecology, OHV use, livestock grazing, and management actions for biological resources are anticipated to be less under Alternative C for special status nongame mammals compared to Alternative A, but more than predicted under Alternative B.

Forest and Woodland Species – In general, forest and woodland special status nongame mammal species occupy similar habitats as forest and woodland special status nongame neotropical migrants and, thus, impacts to the two groups are anticipated to be similar. Forest management under Alternative C emphasizes a sustainable flow of wood products. Management of aspen communities toward DPC under Alternative C is expected to benefit special status nongame mammals occupying this habitat more so than compared to Alternative A; otherwise, anticipated impacts and benefits to forest and woodland nongame mammal species are expected to be similar to Alternative A.

Sagebrush and Shrubland Species – Sagebrush and shrubland special status mammal species are anticipated to benefit from management actions in sagebrush and mountain shrub communities. Alternative C manages more sagebrush and mountain shrub communities toward DPC compared to Alternative A, thereby providing a greater benefit to nongame mammals compared to Alternative A. Potential impacts to white-tailed prairie dogs similar to those for black-tailed prairie dogs described under Grassland Species, below.

Grassland Species – Similar to Alternative A, grassland species are impacted by actions in grassland habitats, such as surface-disturbing activities, reclamation, INPS control, fire, and livestock and wildlife grazing. Alternative C disturbs a similar amount of grassland habitat compared to Alternative A; however, habitat fragmentation is less under Alternative C compared to Alternative A. Less surface disturbance and less habitat fragmentation under Alternative C are anticipated to benefit special status grassland species more than Alternative A.

Alternative C designates a black-tailed prairie dog ACEC, similar to and the same size as described for Alternative B. Under Alternative C, prairie dogs could be shot on public surface lands, beginning after pups have weaned (approximately July 1) and ending October 31. Prairie dog control is not be allowed except for human health and safety reasons. Therefore, designation of a black-tailed prairie dog ACEC and the potential for an increase in prairie dog populations due to these actions would benefit species associated with prairie dog towns, including mountain plover, burrowing owl, swift fox, and black-footed ferret more than Alternative A. Under Alternative C, the BLM manages 145,641 acres of public land for potential reintroduction of black-footed ferrets, which would also benefit other special status grassland species.

Riparian and Wetland Species – The Preble's meadow jumping mouse is the only species in this category. Management actions potentially impacting this species or its critical habitat are described in the Impacts Common to All Alternatives section.

Cave Species – Bats using caves for roosting, maternity colonies, or hibernation could be impacted by surface-disturbing activities near caves, cliffs, or other rock features. Approximately 9,663 acres of identified "rock outcrops/badlands" exist on BLM-administered land, which could contain potential bat habitat. Caves, cliffs, and rock outcrops are often found in relatively steep terrain. Under Alternative C, the BLM limits surface-disturbing activities on slopes greater than 25 percent. Therefore, cave habitats are expected to be protected. Potential adverse impacts to special status bats from wind-energy facilities are anticipated to be less under Alternative C than under Alternative A.

Nongame (Amphibians)

The northern leopard frog is the only special status amphibian in the planning area. This species uses riparian and wetland habitats; therefore, impacts to the northern leopard frog are similar to those described for special status neotropical migrants that use riparian and wetland habitats and less compared to Alternative A.

Alternative D

Game Birds (Greater Sage-Grouse)

Estimated short- and long-term surface disturbance and disturbance to sagebrush habitats from BLM actions in the planning area under Alternative D are the highest of all alternatives (Table 4-11 and Table 4-12). Similar to Alternative A, Alternative D does not propose to avoid or minimize the impacts of habitat fragmentation by protecting blocks of contiguous native habitat. The area open to development of wind-energy facilities is less under Alternative D than under Alternative A; however, Alternative D encourages wind-energy development.

Reclamation requirements under Alternative D are similar to Alternative A, including no temporary protective surface treatment, no topsoil segregation, and no certified weed-free seeding; however, a five growing season timeframe is required under Alternative D.

Alternative D uses full suppression strategies across the entire planning area and, therefore, is expected to contribute to fuel loading and increase the potential for catastrophic fire in sagebrush. In addition, full suppression tactics across the planning area are anticipated to increase the spread of INPS. Together, these actions are anticipated to adversely impact habitats used by the greater sage-grouse in the long term.

Similar to Alternative A, Alternative D does not seek to minimize adverse impacts to sagebrush and other habitats from the spread of INPS by implementing a comprehensive weed management plan. Likewise, Alternative D does not require a 72-hour holding period for livestock prior to movement onto or within public lands. Similar to Alternative A, the spread of INPS under Alternative D is expected to continue, as is the degradation of habitats that INPS invade, including sagebrush.

OHV use under Alternative D is similar to Alternative A. The lack of restrictions to OHV use under Alternative D are anticipated to result in similar potential impacts (i.e., human disturbance and habitat degradation) to greater sage-grouse as under Alternative A.

Under Alternative D, no additional restrictions are placed on livestock grazing in the planning area. Although rangeland productivity is improving in the planning area, Alternative D may not provide sufficient litter and monitoring to ensure a similar improvement in greater sage-grouse nesting habitats. Therefore, livestock grazing under Alternative D is anticipated to have similar impacts to greater sage-grouse habitats as those described for Alternative A.

Under Alternative D, the BLM manages 157,546 acres of sagebrush habitat to achieve DPC; remaining sagebrush habitat is managed toward DFC. Management of sagebrush toward DPC requirements is assumed to provide greater benefits to greater sage-grouse compared to DFC management under Alternative A. Alternative D protects the same buffer acreage for greater sage-grouse leks and early brood-rearing habitats as Alternative A. Greater sage-grouse winter habitats are protected similar to the way they are in Alternative A. No additional special designation occurs under Alternative D for the greater sage-grouse.

Alternative D results in similar surface disturbance, lek buffer acreage protected, no acreage protected from habitat fragmentation, and generally similar restrictive management actions regarding surface

disturbance, reclamation, and resource uses as described for Alternative A. Overall, because surface disturbance and habitat loss, degradation, and fragmentation are similar to Alternative A, impacts to greater sage-grouse also are expected to be similar to Alternative A.

Migratory Game Birds (Waterfowl)

Measurable impacts from surface-disturbing activities, fire management, OHV use, INPS control, and livestock grazing activities under Alternative D are anticipated to adversely impact waterfowl to a similar extent as that compared to Alternative A. Under Alternative D, all new wells and multi-use reservoirs constructed after 1995 are fenced on BLM-administered land. Moreover, Alternative D requires an NSO restriction within 500 feet of perennial streams, wetlands, riparian areas, and water bodies and a CSU restriction from 500 feet to ¼ mile. Alternative D identifies more salt cedar acres for eradication compared to Alternative A. Overall, Alternative D's restrictions and proactive management actions are anticipated to protect and enhance water, wetland, and riparian habitat to a greater benefit for special status waterfowl than Alternative A.

Alternative D continues the Table Mountain, Springer/Bump-Sullivan, and Rawhide HMPs, as described for Alternative A; however, these lands would be disposed to the WGFD within 5 years. Alternative D, manages more miles of lotic and adjacent riparian habitat and more acres of lentic habitat toward DPC compared to Alternative A. Alternative D constructs more new fish and wildlife reservoirs, improves floodplain connectivity on more stream miles, and restores more miles of incised streams compared to Alternative A. The new reservoirs, habitat restoration, and management toward DPC are all anticipated to protect, enhance, and restore special status waterfowl habitat and, thus, benefit special status waterfowl more compared to Alternative A.

Nongame (Raptors)

Surface-disturbing activities, fire management, INPS control, OHV use, livestock grazing, and management actions for biological resources are anticipated to impact special status raptors to a similar extent compared to Alternative A. Restrictions around raptor nests are more extensive under Alternative D, therefore benefiting nesting special status raptors more than under Alternative A.

The development of wind-energy facilities on all BLM-administered land is encouraged under Alternative D, but restricted to power classes 4 through 7 (see Table 3-26) and acreage as described for Alternative C. Without proper siting, Alternative D could adversely impact special status raptors similar to Alternative A. Because acreage is restricted, adverse impacts are expected to be less under Alternative D compared to Alternative A. The area open to wind-energy development under Alternative D is more than alternatives C and E due to the lack of protection for habitat fragmentation, but less than under Alternative A.

All bald eagle roosts are protected by buffers as discussed under Impacts Common to All Alternatives. Full fire-suppression tactics are used across the planning area under Alternative D and are expected to adversely impact bald eagle roost areas more than under Alternative A. In the Jackson Canyon ACEC, prescribed burning is allowed to meet bald eagle management objectives. Forest management activities are allowed to meet bald eagle management objectives. Overall, impacts of these actions to bald eagles are anticipated to be similar to Alternative A.

Alternative D is anticipated to protect more raptor habitat through buffers, thereby providing greater benefit to special status raptors compared to Alternative A; however, management actions for INPS control, OHV use, and fire management under Alternative D are anticipated to result in similar special status raptor habitat quality impacts as under Alternative A.

Nongame (Neotropical Migrants)

Under Alternative D, short- and long-term surface disturbance are anticipated to be similar to Alternative A; therefore, associated adverse impacts to breeding and nesting habitat for neotropical migrants are anticipated to be similar to Alternative A. Wind-energy development is encouraged under Alternative D in power classes 4 through 7 (see Table 3-26); however, the area open to wind-energy development is less compared to Alternative A. Alternative D does not identify contiguous blocks of habitat for protection from habitat fragmentation, similar to Alternative A. Potential impacts to special status neotropical migrants from habitat fragmentation under Alternative D are, therefore, anticipated to be similar to Alternative A.

Because of the diverse and numerous species within the special status neotropical migrant category, the impact analysis organizes these species into the following habitat guilds:

Forest and Woodland Species – Under Alternative D, no specific management actions aimed at maintaining open forest and woodlands stand to benefit wildlife; rather, the goal is to achieve maximum wood growth and flow of wood products. Relative to Alternative A, Alternative D places increased importance on the value of aspen communities by managing toward DPC. Overall, forest management under Alternative D could adversely impact the Lewis's woodpecker by maintaining younger and denser stands of trees.

Sagebrush and Shrubland Species – Measures to protect and reduce potential adverse impacts to greater sage-grouse, as discussed under Game Birds (greater sage-grouse), benefit all sagebrush and shrubland species. Sagebrush and shrubland species also may benefit from management actions in mountain shrub communities. Alternative D places an increased importance on mountain shrub communities relative to Alternative A by managing toward DPC.

Grassland Species – Under Alternative D, no specific management actions for special status neotropical migrants that utilize grasslands exist. These species would be impacted by actions in grassland habitats, such as surface-disturbing activities, reclamation, INPS control, and livestock and wildlife grazing. Under Alternative D, short- and long-term surface disturbance in grassland habitats is similar compared to Alternative A. Also similar to Alternative A, Alternative D does not manage to protect habitat fragmentation, which could adversely impact grassland habitats and special status grassland species. The mountain plover is often found in association with prairie dog towns. The mountain plover tends to prefer nesting areas with only sparse vegetation cover. The long-billed curlew also nests in areas with sparse vegetation. Therefore, these species could also be impacted by management actions for black-tailed and white-tailed prairie dogs (described under Nongame [Mammals]).

Riparian and Wetland Species – Although no specific management actions for special status neotropical migrants using riparian and wetland habitats are identified under Alternative D, these species are expected to benefit from other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats. Under Alternative D, the BLM manages more lotic and adjacent riparian habitat and lentic habitat toward DPC, develops more fish and wildlife reservoirs, improves floodplain connectivity on more miles of stream, and restores more miles of incised streams compared to Alternative A. Therefore, potential impacts to riparian and wetland species under Alternative D are anticipated to be less compared to Alternative A for special status migratory game birds (waterfowl).

Livestock and wildlife tend to congregate at water sources, resulting in damage to riparian habitats. Similar to Alternative A, fencing of streams on BLM-administered land is evaluated on a case-by-case basis under Alternative D.

Platte River Species – Construction of reservoirs, pits, springs, and wells are anticipated to deplete approximately 272 acre-feet of water annually under Alternative D, more than under Alternative A. See the Special Status Species – Fish section for more discussion of water depletion and impacts to Platte River species. Alternative C is anticipated to produce approximately 69 CBNG wells within the North Platte watershed; however, the contribution of produced water from these wells is expected to be negligible compared to projected water depletions. Because Platte River species depend on Platte River habitat and because historical water depletions have impacted these species, projected water depletions from BLM actions in the North Platte watershed may adversely impact the Eskimo curlew, interior least tern, piping plover, and whooping crane.

Overall, the management of habitat toward DPC, the amount of surface disturbance, the management of INPS, OHV use, and livestock grazing under Alternative D are anticipated to result in similar impacts to habitats for special status Platte River species as under Alternative A. Conversely, potential impacts to the Platte River species downstream of the planning area are anticipated to be higher under Alternative D than under Alternative A, primarily due to higher predicted annual average water depletion.

Nongame (Mammals)

Impacts from surface-disturbing activities, INPS control, fire management and ecology, OHV use, livestock grazing, and management actions for biological resources are anticipated to be similar under Alternative D for special status nongame mammals as under Alternative A.

Forest and Woodland Species – In general, forest and woodland special status nongame mammal species occupy similar habitats as forest and woodland special status nongame neotropical migrants and, thus, impacts to the two groups are anticipated to be similar. Forest management under Alternative D emphasizes a maximum wood growth and flow of wood products. Compared to Alternative A, forest management under Alternative D is anticipated to result in similar impacts to special status nongame mammals.

Sagebrush and Shrubland Species – Alternative D manages more sagebrush and more mountain shrub communities toward DPC compared to Alternative A, thereby providing greater benefit to special status nongame mammals compared to Alternative A. Potential impacts to white-tailed prairie dogs are similar to those for black-tailed prairie dogs described under Grassland Species, below.

Grassland Species – Similar to Alternative A, these species are impacted by actions in grassland habitats, such as surface-disturbing activities, reclamation, INPS control, fire, and livestock and wildlife grazing. Alternative D impacts a similar amount of grassland habitat compared to Alternative A. The amount of habitat fragmentation expected under Alternative D is similar under Alternative A. Similar surface disturbance and no protection from habitat fragmentation under Alternative D are anticipated to result in similar impacts to grassland special status nongame mammal species as under Alternative A.

Under Alternative D, a black-tailed prairie dog ACEC is not designated. Restrictions on shooting prairie dogs are the same as under Alternative A. Prairie dog control is allowed only when an adjacent landowner submits a written request and only where the distance to private land is less than ½ mile. Reductions in prairie dog populations may affect other grassland species associated with prairie dog towns, including the mountain plover, burrowing owl, swift fox, and the black-footed ferret. No specific management for potential reintroduction of black-footed ferrets is included under Alternative D, resulting in no additional benefits to the ferret or other special status grassland species.

Riparian and Wetland Species – The Preble's meadow jumping mouse is the only species in this category. Management actions potentially impacting this species or its critical habitat are described in the Impacts Common to All Alternatives section.

Cave Species – Bats that using caves for roosting, maternity colonies, or hibernation could be affected by surface-disturbing activities near caves, cliffs, or other rock features. Approximately 9,663 acres of identified "rock outcrops/badlands" exist on BLM-administered land, potentially containing bat habitats. Caves, cliffs, and rock outcrops are often found in relatively steep terrain. Under Alternative D, no restrictions to surface-disturbing activities on slopes greater than 25 percent are implemented and, thus, Alternative D provides a greater potential to adversely impact cave habitats compared to Alternative A. Because less area is open to development, potential adverse impacts to special status bats from wind-energy facilities are anticipated to be less under Alternative D than under Alternative A.

Nongame (Amphibians)

The northern leopard frog is the only special status amphibian on the planning area. This species uses riparian and wetland habitats; therefore, impacts to the northern leopard frog are similar under Alternative D to those described for neotropical migrants that use riparian and wetland habitats and similar to Alternative A.

Alternative E (Preferred Alternative)

Game Birds (Greater Sage-Grouse)

Short- and long-term surface disturbance, including impacts to sagebrush, anticipated under Alternative E are expected to be similar to Alternative A (Tables 4-11 and 4-12). However, Alternative E proposes to avoid or minimize the impacts of habitat fragmentation by protecting 8 blocks of contiguous native habitat (including sagebrush) compared to 0 blocks under Alternative A. The development of wind-energy facilities is restricted to outstanding/superb and good/excellent power classes (see Table 3-26) under Alternative E compared to no restriction under Alternative A.

Reclamation requirements under Alternative E are more stringent than under Alternative A, including a temporary protective surface treatment on a case-by-case basis, limited topsoil salvage, a requirement for certified weed-free seeding, and a three growing season timeframe for completing reclamation.

Alternative E restores a natural fire regime to fire-adapted ecosystems in the planning area and uses prescribed fire to achieve measurable watershed-level objectives. The anticipated reduction in fuel loads under Alternative E is anticipated to reduce the potential for catastrophic fire, which could benefit greater sage-grouse nesting habitats. Alternative E also minimizes fire suppression activities around greater sage-grouse leks, thereby minimizing adverse impacts compared to Alternative A.

Alternative E seeks to minimize adverse impacts to sagebrush and other habitats from the spread of INPS by implementing a comprehensive weed management plan for the entire planning area. In addition, the BLM's authorized officer could require a 72-hour holding period for livestock prior to movement onto public lands under Alternative E. Developing and implementing a weed management plan is anticipated to slow the spread of INPS in the planning area, thereby benefiting greater sage-grouse habitats more than Alternative A.

OHV use under Alternative E is more restrictive than under Alternative A. Restrictions to OHV use under Alternative E are anticipated to result in fewer potential impacts (human disturbance and habitat degradation) to greater sage-grouse compared to Alternative A.

Alternative E manages livestock grazing to maintain a protective cover of vegetation and litter with emphasis on the condition of allotments with substantial acreage of highly erosive soils and high-priority allotments (categories I and M, see Glossary). The emphasis on litter in grazing allotments under Alternative E is expected to benefit greater sage-grouse more than Alternative A.

Under Alternative E, the BLM manages 630,183 acres of sagebrush habitat to achieve DPC. Management of sagebrush toward DPC requirements is assumed to provide greater benefits to greater sage-grouse than managing toward DFC as under Alternative A. Alternative E protects more lek habitats compared to Alternative A. Alternative E also protects more nesting and early brood-rearing habitats on BLM-administered surface and federal mineral estate compared to Alternative A. Similar to Alternative A, greater sage-grouse winter habitats are protected from surface disturbance and disruptive activities from November 15 to March 14; however, Alternative E restrictions also apply to greater sage-grouse habitats in the Bates Hole and Fish Creek/Willow Creek areas. No additional special designations are under Alternative E for the greater sage-grouse.

Restrictions on surface disturbance or occupancy proposed by Alternative E are anticipated to benefit greater sage-grouse during their sensitive nesting and wintering periods and in sensitive habitats, such as leks. Less proposed surface disturbance, more lek buffer acreage protected, more acreage protected from habitat fragmentation, and generally more restrictive management actions regarding surface disturbance, reclamation, and resource uses within the planning area under Alternative E are expected to have less adverse and more beneficial impacts to greater sage-grouse compared to Alternative A.

Migratory Game Birds (Waterfowl)

Measurable impacts from surface-disturbing activities, fire management, OHV use, INPS control, and livestock grazing activities are anticipated to adversely impact special status waterfowl less under Alternative E than under Alternative A. Under Alternative E, all new and existing wells and springs are fenced. Fencing of multi-use reservoirs are considered on a case-by-case basis on BLM-administered land. Alternative E requires a CSU restriction within ¼ mile of all Class 1 perennial streams, wetlands, riparian areas, and water bodies and considers all other streams on a case-by-case basis. Alternative E develops a plan to reduce or eliminate all salt cedar acres in the planning area over the life of the plan, an improvement to habitats compared to Alternative A. Overall, Alternative E's restrictions and proactive management actions are anticipated to protect and enhance water, wetland, and riparian habitat to the benefit of special status waterfowl to a greater extent compared to Alternative A.

Alternative E continues the Table Mountain, Springer/Bump-Sullivan, and Rawhide HMPs as described for Alternative A; however, these lands would be disposed to the WGFD within 5 years. Alternative E manages more miles of lotic and adjacent riparian habitats and more acres of lentic habitats toward DPC compared to Alternative A. Alternative E also constructs more new fish and wildlife reservoirs, improves floodplain connectivity on more stream miles, and restores more miles of incised streams compared to Alternative A. The new reservoirs, habitat restoration, and management toward DPC are all anticipated to protect, enhance, and restore special status waterfowl habitats and, thus, benefit special status waterfowl more than Alternative A.

Nongame (Raptors)

Surface-disturbing activities, fire management, INPS control, OHV use, livestock grazing, and management actions for biological resources are anticipated to impact special status raptors less and benefit special status raptor habitat more under Alternative E compared to Alternative A. Restrictions around special status raptor nests are more extensive under Alternative E; therefore, benefiting nesting special status raptors more compared to Alternative A.

Developing wind-energy facilities on BLM-administered land are encouraged, but restricted to power classes 4 through 7 (see Table 3-26) under Alternative E, thereby reducing the potential for fragmenting habitats compared to Alternative A. Without proper siting, Alternative E has the potential to adversely impact special status raptor species similar to Alternative A. Restrictions to surface-disturbing activities, amount of surface disturbance, fire suppression, livestock grazing, OHV use, and INPS management

under Alternative E are anticipated to impact special status raptors less and benefit special status raptor habitats more compared to Alternative A. In addition, restrictions on wind-energy development under Alternative E are anticipated to benefit special status raptors more than Alternative A.

All bald eagle roosts are protected by buffers, as discussed under Impacts Common to All Alternatives. Fire management under Alternative E is similar to Alternative B and prohibits felling of trees within 200 yards of bald eagle roots during suppression. In the Jackson Canyon ACEC, forest management activities and prescribed burning are similar to Alternative A relative to bald eagle management objectives.

Alternative E is anticipated to maintain the upward trend of improving rangeland productivity for the short term. Developing a plan for eradicating salt cedar under Alternative E is expected to control INPS more effectively compared to Alternative A. Overall, there is more effective INPS control, more buffer area protection around raptor nests, and less area open to wind-energy development under Alternative E, thereby providing greater benefit to special status raptors compared to Alternative A.

Nongame (Neotropical Migrants)

Short- and long-term surface disturbance are anticipated to be less under Alternative E compared to Alternative A; therefore, associated adverse impacts to breeding and nesting habitat for special status neotropical migrants are anticipated to be less. Since wind-energy development is limited under Alternative E, impacts to special status neotropical migrants from wind-energy development are anticipated to be less than Alternative A.

Because of the diverse and numerous species within the neotropical migrant category, the impact analysis organizes these species into the following habitat guilds:

Forest and Woodland Species – Compared to Alternative A, there are specific management actions under Alternative E aimed at maintaining open forest and woodland stands to benefit wildlife. Management actions that promote open, old-growth characteristics benefit the Lewis's woodpecker. Alternative E manages ponderosa pine stands for old growth (including snags) in Little Red Creek, Esterbrook, and Jackson Canyon. In other areas, the emphasis is on the sustainable flow of wood products. Relative to Alternative A, Alternative E places increased importance on the value of aspen communities by managing aspen toward DPC.

Sagebrush and Shrubland Species – Measures to protect and reduce potential adverse impacts to sage-grouse, as discussed under Game Birds (greater sage-grouse), benefit all sagebrush and shrubland species. Sagebrush and shrubland species may also benefit from management actions in mountain shrub communities. Relative to Alternative A, Alternative E places an increased importance on mountain shrub communities by managing toward DPC.

Grassland Species – Although no specific management actions for special status neotropical migrants that utilize grasslands were identified for Alternative E, these species are expected to benefit from actions that treat woodland encroachment into grassland habitats where it is detrimental to grassland species. Grassland special status neotropical migrant species are impacted by actions in grassland habitat, such as surface-disturbing activities, reclamation, INPS control, and livestock and wildlife grazing. Alternative E is expected to disturb more grassland habitat compared to Alternative A; however, Alternative E is also expected to protect more grassland habitat from habitat fragmentation compared to Alternative A. The mountain plover is often found in association with prairie dog towns. The mountain plover tends to prefer nesting areas with only sparse vegetation cover. The long-billed curlew also nests in areas with sparse vegetation. Therefore, these species are also impacted by management actions for black-tailed and white-tailed prairie dogs (discussed under Nongame [Mammals]).

Riparian and Wetland Species – Although no specific management actions for special status neotropical migrants using riparian and wetland habitats are identified under Alternative E, these species are expected to benefit from other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats. For example, Alternative E manages more lotic and adjacent riparian habitats and more lentic habitats toward PFC, develops more fish and wildlife reservoirs, improves floodplain connectivity and function on more miles of stream, and restores more miles of incised streams compared to Alternative A.

Livestock and wildlife tend to congregate at water sources, resulting in damage to critical riparian habitats. Alternative E protects and enhances riparian and wetland management by managing livestock and grazing wildlife in these areas. Management actions could include fencing, developing alternative water supplies for livestock, herding, placing feed and mineral supplements away from water sources, and adjusting to pasture boundaries and season of use. Furthermore, Alternative E does not allow surface-disturbing activities and heavy equipment on wet soils. These actions are expected to ultimately result in a riparian system with increased vegetation and structural diversity, leading to a potential increase in abundance and diversity of special status neotropical migrants.

Platte River Species – Construction of reservoirs, pits, springs, and wells are anticipated to deplete approximately 270 acre-feet of water annually under Alternative E, more than under Alternative A. See the Special Status Species – Fish section for more discussion of water depletion and impacts to Platte River species. Alternative E is anticipated to produce approximately 106 CBNG wells within the North Platte watershed; however, the contribution of produced water from these wells is expected to be negligible compared to projected water depletions. Because Platte River species depend on Platte River habitats and because historical water depletions have impacted these species, projected water depletions from BLM actions in the North Platte watershed may adversely impact the Eskimo curlew, interior least tern, piping plover, and whooping crane.

Overall, managing habitat toward DPC, less surface disturbance, and managing INPS, OHV use, and livestock grazing under Alternative E are anticipated to protect and enhance more habitat and, thus, benefit special status neotropical migrants within the planning area more than Alternative A. Conversely, potential impacts to the Platte River species, downstream of the planning area, are anticipated to be more under Alternative E than under Alternative A, primarily due to higher predicted annual average water depletion.

Nongame (Mammals)

Impacts from surface-disturbing activities, the spread of INPS, fire management and ecology, OHV use, livestock grazing, and management actions for biological resources are anticipated to be less for special status nongame mammals under Alternative E compared to Alternative A.

Forest and Woodland Species – In general, forest and woodland special status nongame mammal species occupy similar habitats as forest and woodland special status nongame neotropical migrants and, thus, impacts to the two groups are anticipated to be similar. Forest management under Alternative E emphasizes a sustainable flow of wood products, while also managing for multiple use. Compared to Alternative A, forest management under Alternative E is anticipated to result in fewer impacts to special status nongame mammals.

Sagebrush and Shrubland Species – Sagebrush and shrubland special status mammal species are anticipated to benefit from management actions in sagebrush and mountain shrub communities. Alternative E manages more sagebrush and more mountain shrub communities toward DPC compared to Alternative A, thereby providing more benefit to special status nongame mammals compared to

Alternative A. Potential impacts to white-tailed prairie dogs are similar to those for black-tailed prairie dogs discussed under Grassland Species, below.

Grassland Species – These species would be impacted by actions in grassland habitats, such as surface-disturbing activities, reclamation, INPS control, and livestock and wildlife grazing. Alternative E disturbs a similar amount of acres of grassland habitat compared to Alternative A; however, Alternative E reduces habitat fragmentation compared to Alternative A. Less surface disturbance and less habitat fragmentation under Alternative E are anticipated to benefit special status nongame mammal species more than under Alternative A.

Under Alternative E, a black-tailed prairie dog ACEC is not designated. Under Alternative E, according to WGFD hunting regulations, there are no restrictions on shooting prairie dogs. Prairie dog control is allowed only when an adjacent landowner submits a written request and only where the distance to private land is less than ½ mile. Reductions in prairie dog populations may affect other grassland species associated with prairie dog towns, including the mountain plover, burrowing owl, swift fox, and the black-footed ferret. No specific management for potential reintroduction of black-footed ferrets are in Alternative E, resulting in no additional benefits to the ferret or other special status grassland species.

Riparian and Wetland Species – The Preble's meadow jumping mouse is the only species in this category. Management actions potentially impacting this species or its critical habitat are described in the Impacts Common to All Alternatives section.

Cave Species – Bats using caves for roosting, maternity colonies, or hibernation could be affected by surface-disturbing activities near caves, cliffs, or other rock features. Approximately 9,663 acres of identified "rock outcrops/badlands" are on BLM-administered land that could contain potential bat habitats. Caves, cliffs, and rock outcrops are often found in relatively steep terrain. Under Alternative E, the BLM would restrict surface-disturbing activities on slopes greater than 25 percent; therefore, cave habitats are expected to be protected. Because of restrictions on wind-energy development, potential adverse impacts to special status bats from wind-energy facilities are anticipated to be less under Alternative E than under Alternative A.

Nongame (Amphibians)

The northern leopard frog is the only special status amphibian on the planning area. This species uses riparian and wetland habitats; therefore, impacts to the northern leopard frog under Alternative E are similar to those described for special status neotropical migrants using riparian and wetland habitats and less compared to Alternative A.

4.4.9.3 Conclusion

Based on the projected disturbance and proposed actions summarized in Appendix M, Tables 4-11 and 4-12 and the impacts described in this section, the following conclusions are made:

Alternative B disturbs the least area both short and long term compared to other alternatives. Short- and long-term surface disturbance to BLM-administered land and to vegetation types for the other alternatives are projected to be similar and substantively more than Alternative B.

Alternatives B, C, and E protect blocks of contiguous native habitat from habitat fragmentation. Alternative B proposes to protect the most habitat followed by alternatives C and E. Alternatives A and D do not propose to protect habitat from habitat fragmentation.

Alternatives B and E are anticipated to protect the largest area for greater sage-grouse leks, nesting and early brood-rearing habitats, and winter habitats. Alternatives A, C, and D protect similar, but less acreage. Other sagebrush-dependent species (e.g., Brewer's sparrow, sage sparrow, and sage thrasher) are anticipated to benefit from protective management actions for the greater sage-grouse.

Alternatives B and C protect the largest area around natural raptor nests and artificial nesting structures. Alternatives D and E protect similar, but less area. Alternative A does not provide buffers for artificial nesting structures, and therefore, protects the smallest amount of land for raptor nests.

The potential to adversely impact the Platte River species downstream of the planning area is greatest under alternatives B and C because these alternatives result in the highest annual water depletions to the Platte River System. Alternative A is projected to have the smallest annual water depletion to the Platte River System. Alternatives D and E are projected to deplete more water to the Platte River System than Alternative A, but less than alternatives B and C.

For other special status species, there are no specific management actions that directly address their protection or conservation. Therefore, adverse or beneficial impacts to special status species' habitats provided a more meaningful comparison of impacts among alternatives. Alternative B provides the greatest beneficial impacts to special status wildlife habitats by imposing the most restrictions to minimize habitat disturbance, loss, fragmentation, and degradation, and by including the most proactive actions to restore and enhance habitats. Alternatives D and A have the greatest adverse impacts to wildlife habitats and, therefore, the fewest beneficial impacts for special status wildlife. Alternatives C and E generally provide intermediate levels of benefits. In the long term, the overall potential impact of alternatives to special status wildlife species in order of ascending adverse and descending beneficial impacts, are B, C and E, A and D.

4.5 Heritage and Visual Resources

The heritage and visual resources section describes the potential impacts to cultural, paleontological, and visual resources with respect to each alternative. Within each resource, the methods and assumptions, analysis of alternatives, and a conclusion are provided.

4.5.1 Cultural Resources

Cultural resources are fragile, nonrenewable evidence of past human history and heritage on the landscape. They are public resources entrusted to the BLM for protection and interpretation, providing a context for present-day land use decisions. Actions that could occur through implementing each alternative could impact cultural resources in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as being beneficial or adverse. Historic trails are analyzed in detail in the National Historic Trails and Other Historic Trails section in this chapter and Native American concerns are identified in this section and in the Tribal Treaty Rights section. Refer to Map 31 for cultural resources (Volume 2).

Direct impacts to cultural resources from RMP alternatives typically result from actions that disturb the soil or physically alter, damage, or destroy all or part of a resource; alter characteristics of the surrounding environment that contribute to resource significance; introduce visual or audible elements out of character with the property or alter its setting; or result in neglect of the resource to the extent that it deteriorates or is destroyed. For example, surface-disturbing activities are considered an adverse direct impact because the resource is nonrenewable; once it has been disturbed, the potential for collecting or preserving meaningful data is lost. For the purposes of this analysis, actions resulting in data collection and preservation of cultural resources could be considered beneficial impacts but, in fact, are neutral or nonadverse impacts, as the action merely maintains the status quo. A truly beneficial impact to cultural resources enhances values, such as construction of interpretive signs. Indirect impacts to cultural resources result from project-induced increases or decreases in activity in the planning area. For example, constructing a recreational facility may increase visitor use, but could result in indirect impacts to previously undisturbed cultural resources.

As a practical matter, there is little difference between short- and long-term impacts from surface disturbance. Once a disturbance occurs to a cultural resource, the alteration is permanent. Restoration occasionally can be done in some cases, and stabilization can halt additional deterioration, but once a portion of a site is damaged, it can rarely be repaired. The duration of a disturbing element or activity can be considered as short-term or long-term. A pipeline construction corridor is a short-term disturbance, as normal reclamation ultimately stabilizes the soil. A disturbance continuing beyond 5 years is considered long-term.

For all agency undertakings with the potential to adversely impact historic properties (i.e., cultural resources that are eligible for, or listed in, the National Register of Historic Places [NRHP]), the BLM complies with Section 106 of the National Historic Preservation Act (NHPA). Section 106 compliance typically includes a cultural resources inventory and evaluation of any resources found. If historic properties are present, the BLM consults with the State Historic Preservation Office (SHPO), interested Native American tribes, and other interested parties in developing mitigation measures for adversely affected properties. Under all alternatives, the BLM continues its obligation to conduct government-to-government consultation with interested tribes regarding the sensitive resources of the planning area.

Impacts to Native American traditional resources or sacred sites are identified in consultation with the impacted tribes. The Eastern Shoshone Tribe indicated that the setting of sacred sites, including solitude, peace and quiet, and the view of the surrounding area, are important to maintaining the quality of the

resource. Alterations to these characteristics can adversely impact traditional use of the area. While temporary disturbances, such as construction activities, are not identified as a major concern of the Eastern Shoshone Tribe, long-term increases in noise, changes in the visual setting and smells, as well as increases in motion and activity, all have the potential to detract from the tribe's setting. Other tribes may, in the future, make known similar or additional concerns that may impact sites in which they have a heritage interest. In addition, physical impacts to traditional or sacred sites and limitations on tribal access can impact traditional use.

The BLM initiated contact with tribes, listed alphabetically below, to identify potential impacts of the alternatives to sites of cultural concern on BLM lands.

- Blackfeet Nation
- Cheyenne River Sioux Tribe
- Confederated Salish and Kootenai Tribe
- Crow Tribe
- Eastern Shoshone Tribe
- Kiowa Tribe of Oklahoma
- Lower Brule Sioux Tribe
- Nez Perce Tribe
- Northern Arapaho Tribe
- Northern Cheyenne Tribe
- Oglala Lakota Tribe
- Rosebud Sioux Tribe
- Shoshone-Bannock Tribe
- Ute Tribe

4.5.1.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Cultural resources will continue to be found throughout the planning area.
- All surface-disturbing activities could adversely impact cultural resources.
- Natural and prescribed fire could damage rock art sites and sites composed of combustible materials.
- Protection for all cultural resources will occur in accordance with federal laws and BLM regulations and agreements, regardless of whether the resources are specifically identified in the RMP.
- Adverse impacts to cultural resources from surface-disturbing activities occur primarily at the time the initial surface disturbance occurs. Therefore, the projected numbers for short-term surface disturbance are used to quantify impacts to cultural resources.
- The intensity of surface disturbance by alternative, as identified in Appendix M, equates to levels of development and, in turn, increased access to public lands.

4.5.1.2 Analysis of Alternatives

As cultural resources are impacted by management actions under each alternative, actions for cultural resources can, in turn, impact other resources. For example, constraints placed on surface disturbance on or around specific cultural sites may impact desired actions under another resource. The impacts of cultural resources on other resource topics (e.g., physical, biological, fire management and ecology, etc.) are discussed under the appropriate impacted resources.

Impacts Common to All Alternatives

The types of impacts projected to occur to cultural resources as a result of the various alternatives are similar; however, the intensity of the impacts is anticipated to vary. Therefore, impacts to cultural resources from surface-disturbing activities, such as minerals development, rights-of-way (ROW), facilities development, OHV use, recreational, fire management, and proactive cultural resource

management actions are described under individual alternatives. Essentially, any activity that creates or has the potential to create surface disturbance, regardless of the resource program to which it may be associated, can cause potential impacts to cultural resources.

Under all alternatives, all eligible sites or sites listed in the NRHP within the 1,633-acre Notches Dome Archeological District (48NA368) are subject to an NSO restriction. An onsite Class III inventory prior to implementing any surface development proposals would be required. Similarly, NSO would be permitted on the Spanish Diggings prehistoric quarry (48PL48). These management actions result in a beneficial impact to cultural resources. For all alternatives, management of fish and wildlife resources could have an indirect beneficial impact on cultural resources if improving fisheries and other habitat enhance the availability of traditional resources. The situation is similar for soils management, in which reducing erosion and limiting erosion of highly erosive soils help preserve archeological sites. Management of natural and prescribed fire can directly and adversely impact cultural resources by direct disturbance from suppression, thermal effects on rock art panels, or burning sites composed of combustible materials, such as wickiups, corrals, or historic sites. Indirect impacts would derive from new exposures of cultural materials, making them available for illicit collection or disruption by erosion. Positive impacts can be seen, in that previously covered sites are exposed and made available for recording.

Alternative A

Surface-disturbing Activities. Under Alternative A, surface-disturbing activities by resources identified in Appendix M could impact cultural resources. Under Alternative A, the projected short-term surface disturbance (59,990) from BLM actions results in the third highest disturbance acreage, following alternatives E and D, respectively (refer to Table 4-1). The net potential adverse impact to cultural resources is limited, however, because compliance with Section 106 of the NHPA requires that some type of mitigation be applied to historic properties prior to any disturbance. The relative amount of surface disturbance projected for each alternative defines the level of potential to impact cultural resources.

The impacts to cultural resources from surface-disturbing activities under Alternative A are anticipated to be commensurate with the intensity of RFAs shown in Appendix M. Moreover, the impacts to cultural resources from surface disturbance projected for Alternative A are anticipated to be primarily adverse. However, normal compliance with Section 106 of the NHPA prior to the approval of an action serves to moderate the amount of actual disturbance to cultural resources. In those cases in which an accommodation cannot be made, consultation between the BLM and the SHPO takes place to develop and implement a treatment plan to mitigate adverse impacts to historic properties. While this often results in data recovery, planned excavation, detailed recording and mapping, Historic American Buildings Survey/Historic American Engineering Record documentation, or interpretation are among the variety of techniques that can be used for mitigation, depending on the type of site and the nature of the potential adverse impacts.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative A provide additional protection for cultural resources. For example, under Alternative A, surface-disturbing activities are reviewed on a case-by-case basis and NSO would be allowed on slopes greater than 25 percent without permission of the authorized officer. One TCP, Cedar Ridge (identified by the Eastern Shoshone), is known to occur in the planning area. Sensitive and significant values at Cedar Ridge are protected on a case-by-case basis. These management actions result in beneficial impacts to cultural resources; however, fewer restrictions on surface-disturbing activities are provided for under Alternative A as compared to alternatives B, C, and E. Therefore, additional protection for cultural resources under Alternative A are less than all other alternatives, except Alternative D.

Land Disposal and Acquisition. Disposal of BLM-administered surface land can result in both beneficial and adverse impacts to cultural resources. The results of the survey required under Section 106 of the NHPA causes a beneficial impact to cultural resources because it generates data that promotes further understanding of cultural resources in the planning area. However, if historic properties are identified during the inventory, it could result in an adverse impact, because once in private ownership, there are no protective measures for cultural resources. Land-tenure adjustment is classed as an adverse impact (in terms of Section 106) for that reason. Historic properties need to be mitigated by application of a treatment plan developed through consultation between the BLM and the SHPO. In other words, cultural resource issues have to be resolved prior to any changes in land ownership. Under Alternative A, 103,725 acres of BLM-administered surface are identified for disposal by sale. This is the lowest acreage identified for disposal under all the alternatives. Acquisition of lands within the planning area could result in a beneficial impact to cultural resources in that additional sites may be obtained in the newly acquired lands..

Access. General development (e.g., recreational facilities and mineral development) and OHV use can provide access to remote cultural resource locations leading to adverse impacts related to traffic, vandalism, and erosion.

For the purpose of this analysis, development activities are anticipated to be similar in intensity to the surface disturbance acres identified in Table 4-1. Based on this assumption, the third highest amount of development and increase in access occurs under Alternative A and results in an indirect adverse impact to cultural resources. Because adverse impacts to historic properties must be mitigated prior to authorizing an action, the degree of adverse impact is lessened.

Increased visitor use through OHV use and improved access can have both beneficial and adverse impacts on cultural resources. For example, archeological sites are protected when there are access restrictions, but may be exposed to vandalism or other impacts if multiple uses increase, including exploration for extractive resources (e.g., mining) or an increase in recreational opportunities. However, lack of access also can adversely impact the use of traditional cultural resources.

OHV use on public lands, under all alternatives, indirectly impacts cultural resources. The impacts of OHV use are primarily anticipated to be adverse, indirect, and to occur in the areas limited to existing roads and trails for OHV use. Alternative A projects the largest area (1,311,715 acres) as limited to existing roads and trails for OHV use (Table 2-1). Although OHV use is currently restricted in some areas, and use is limited to existing and limited to designated roads and trails, new trails are constantly being created and become part of the "existing designation." The Oregon and Bozeman trails are closed to OHV use, which would result in beneficial impacts to cultural resources (see National Historic Trails and Other Historic Trails in this chapter).

Proactive Cultural Resource Management Actions. Under Alternative A, an NSO restriction is in place for those cultural sites within the 1,633-acre Notches Dome Archeological District that may be or have been nominated to the National Register of Historic Places (NRHP). In addition, within the Notches Dome Archeological District, Class III inventories are required prior to authorization of surface development proposals. These proactive cultural resource management actions result in beneficial impacts to cultural resources within the Notches Dome Archeological District.

Other proactive cultural resource management actions include NSO restrictions on sites 48NA227, 48NA940, and 48NA84. This management action results in a beneficial impact to the identified cultural resources.

Under Alternative A, cultural resource inventories and site evaluations are in direct response to specific land use proposals in accordance with Section 106 of the NHPA. Additional inventory is carried out when resources permit to comply with Section 110 of the NHPA. While these actions benefit cultural resources, they are the minimum required by law. No additional protective measures are identified under Alternative A for Pine Ridge.

Alternative B

Surface-disturbing Activities. Under Alternative B, the projected short-term disturbance acreage (36,650 acres) from BLM actions is the lowest of any alternative (refer to Table 4-1). As in Alternative A, the net potential disturbance to historic properties is lessened by the requirement to conduct inventories and properly deal with such properties prior to any disturbance.

The impacts to cultural resources from surface-disturbing activities under Alternative B are anticipated to be adverse, similar in type to Alternative A, and commensurate with the locations and intensity of RFAs shown in Appendix M. However, the intensity of adverse impacts to cultural resources from surface-disturbing activities under Alternative B is anticipated to be less than Alternative A and the least relative to all other alternatives.

Relative to Alternative A and other alternatives, Alternative B incorporates the most restrictions on surface-disturbing activities. Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative B provide additional protection for cultural resources. For example, under Alternative B, NSO is allowed on highly erosive soils or on slopes greater than 25 percent and in the Cedar Ridge TCP with a CSU restriction in the periphery as defined in Table 2-3. These types of management actions result in beneficial impacts to cultural resources.

Land Disposal and Acquisition. The types of impacts from disposal of BLM-administered surface land under Alternative B are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative B, 109,210 acres of BLM-administered surface are identified for disposal by sale. Approximately 5-percent more than proposed under Alternative A. Disposal of BLM-administered surface results in both a beneficial and adverse impact to cultural resources as described in Alternative A.

Access. The indirect adverse impacts of access from development and OHV use under Alternative B are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative B proposes the least amount of development of any alternative (as represented by surface disturbance numbers in Table 4-1) and provides the smallest area (909,651 acres) for OHV use limited to existing roads and trails, a 31-percent decrease from Alternative A (1,311,715 acres). These management actions result in indirect adverse impacts to cultural resources, but less adverse impacts than under Alternative A.

Proactive Cultural Resource Management Actions. Proactive cultural resource management actions for the 1,633-acre Notches Dome Archeological District under Alternative B are the same as those identified under Alternative A. For sites 48NA227, 48NA940, and 48NA84, Alternative B offers additional protection compared to Alternative A by including an NSO restriction not only on the site, but also within a 300-foot buffer around each site. This management action results in beneficial impacts to the identified cultural resources.

Under Alternative B, cultural resource inventories and site evaluations are the same as those identified under Alternative A, except that Class III block surveys are conducted on leases, oil and gas units, oil and gas fields, and similar large-scale development areas. This management action results in a beneficial impact to cultural resources.

The minimum cultural resource block inventory size for Pine Ridge under Alternative B is 40 acres. Linear inventories will cover a minimum of 100 feet on either side of the centerline. This action results in a beneficial impact to cultural resources. No similar action is identified for Pine Ridge in Alternative A. More area is inventoried for cultural resources under Alternative B than under Alternative A.

Alternative C

Surface-disturbing Activities. Under Alternative C, the projected short-term disturbance acreage (58,689 acres) from BLM actions results in the fourth highest disturbance acreage following alternatives E, D, and A, respectively (refer to Table 4-1). Again, the net potential disturbance to historic properties is lessened by the requirement to conduct inventories and properly deal with such properties prior to any disturbance.

The impacts to cultural resources from surface-disturbing activities under Alternative C are anticipated to be adverse, similar in type to Alternative A, and commensurate with the locations and intensity of RFAs shown in Appendix M. However, the intensity of adverse impacts to cultural resources from surface-disturbing activities under Alternative C is anticipated to be less than under Alternative A.

Restrictions on surface-disturbing activities to protect other resources (e.g., soil, water, biological resources, and special designations) under Alternative C provide additional protection for cultural resources. For example, under Alternative C, surface disturbance on highly erosive soils are minimized to the extent practicable and NSO is allowed on slopes greater than 25 percent with highly erosive soils. In addition, NSO is allowed in the Cedar Ridge TCP and a CSU restriction in the TCP's periphery, as defined in Table 2-3. These types of management actions result in beneficial impacts to cultural resources.

Land Disposal and Acquisition. The types of impacts from disposal of BLM-administered surface under Alternative C are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative C, 241,364 acres of BLM-administered surface are identified for disposal by sale. Approximately 233-percent more than proposed under Alternative A (103,725 acres). Disposal of BLM-administered surface results in both beneficial and adverse impacts to cultural resources, as described in Alternative A.

Access. The indirect adverse impacts of access from development and OHV use under Alternative C are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative C proposes a decrease in development compared to Alternative A (as represented by surface disturbance numbers in Table 4-1) and Alternative C designates the fourth highest acreage (along with Alternative E) to OHV use limited to existing roads and trails (1,162,113 acres), an 11-percent decrease from Alternative A (1,311,715 acres). These management actions would result in indirect adverse impacts to cultural resources. The impacts are similar in intensity to those identified in Alternative A.

Proactive Cultural Resource Management Actions. Proactive cultural resource management actions for the 1,633-acre Notches Dome Archeological District under Alternative C are the same as those identified under Alternative A. For sites 48NA227, 48NA940, and 48NA84, Alternative C offers additional protection compared to Alternative A by maintaining the NSO restriction within the site boundaries and adding a CSU restriction on public lands within 300 feet of each site. This management action results in beneficial impacts to the identified cultural resources.

Under Alternative C, cultural resource inventories are conducted on the area of potential impact plus a buffer zone of at least 300 feet. Inventory boundaries are identified on a project-by-project basis. This management action would result in beneficial impacts to cultural resources.

The minimum cultural resource block inventory size for Pine Ridge under Alternative C is 40 acres. Linear inventories will cover a minimum of 100 feet on either side of the centerline. This management action results in beneficial impacts to cultural resources. No similar action is identified for Pine Ridge in Alternative A. More area is inventoried for cultural resources under Alternative C than under Alternative A.

Alternative D

Surface-disturbing Activities. Under Alternative D, the projected short-term disturbance acreage (63,649 acres) from BLM actions results in the greatest acreage of all the alternatives (refer to Table 4-1). The net potential disturbance to historic properties is lessened by the requirement to conduct inventories and properly deal with such properties prior to any disturbance.

The impacts to cultural resources from surface-disturbing activities under Alternative D are anticipated to be adverse, similar in type to Alternative A, and commensurate with the locations and intensity of RFAs shown in Appendix M. However, the intensity of adverse impacts to cultural resources from surface-disturbing activities under Alternative D is anticipated to be more than under Alternative A.

Fewer restrictions on surface-disturbing activities for protecting other resources (e.g., soil, water, biological resources, and special designations) are provided under Alternative D; therefore, additional protection for cultural resources under Alternative D is less than all other alternatives. For example, under Alternative D, surface disturbance on highly erosive soils and slopes greater than 25 percent is allowed, and surface-disturbing activities on the Cedar Ridge TCP are subject to a CSU restriction with no additional protection for the periphery. These types of management actions result in beneficial impacts to cultural resources; however, they are less beneficial than under any other alternative.

Land Disposal and Acquisition. The types of impacts from disposal of BLM-administered surface under Alternative D are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative D, 224,834 acres of BLM-administered surface are identified for disposal by sale. Approximately 217-percent more than proposed under Alternative A (103,725 acres). The impacts of land-tenure adjustment will be much like those described in Alternative A, although with less acreage.

Access. The indirect adverse impacts of access from development and OHV use under Alternative D are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative D proposes an increase in development compared to Alternative A (as represented by surface disturbance numbers in Table 4-1) and the highest level of development of all alternatives. Alternative D designates the second highest acreage to OHV use limited to existing roads and trails (1,292,630 acres), a 1-percent decrease from Alternative A (1,311,715 acres). These actions result in indirect adverse impacts to cultural resources. The adverse impacts under Alternative D are greater than those identified under Alternative A, as well as all other alternatives.

Proactive Cultural Resource Management Actions. Proactive cultural resource management actions for the 1,633-acre Notches Dome Archeological District under Alternative D are the same as those identified under Alternative A. Likewise, proactive cultural resource management actions under Alternative D for sites 48NA227, 48NA940, and 48NA84 are the same as those identified under Alternative A.

Under Alternative D, cultural resource inventories are conducted on the area of potential impact plus a buffer zone of at least 100 feet. Inventory boundaries are identified on a project-by-project basis. This management action results in a beneficial impact to cultural resources. No additional protective measures

are identified under Alternative D for Pine Ridge. Slightly more area is inventoried for cultural resources under Alternative D than in Alternative A.

Alternative E (Preferred Alternative)

Surface-disturbing Activities. Under Alternative E, the projected short-term disturbance acreage (61,274 acres) from BLM actions results in the second highest disturbance acreage following Alternative D (refer to Table 4-1). As in all other alternatives, the net potential disturbance to historic properties is lessened by the requirement to conduct inventories and properly deal with such properties prior to any disturbance.

The impacts to cultural resources from surface-disturbing activities under Alternative E are anticipated to be adverse, as is the case for all alternatives and commensurate with the locations and intensity of RFAs as shown in Appendix M. However, the intensity of adverse impacts to cultural resources from surface-disturbing activities under Alternative E are anticipated to be more than under Alternative A. The net potential disturbance to historic properties is lessened by the requirement to conduct inventories and properly deal with such properties prior to any disturbance.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative E provide additional protection for cultural resources. Under this alternative, surface disturbance on highly erosive soils is minimized to the extent practicable and NSO would be allowed in the Cedar Ridge TCP. These types of management actions result in beneficial impacts to cultural resources.

Land Disposal and Acquisition. The types of impacts from disposal of BLM-administered surface under Alternative E are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative E, 224,834 acres of BLM-administered surface are identified for disposal by sale, approximately 216-percent more than proposed under Alternative A (103,725 acres). Disposal of BLM-administered surface results in both a beneficial and adverse impact to cultural resources, as described in Alternative A. Unlike Alternative A, under Alternative E, the BLM would actively seek to acquire lands with sensitive cultural resource values resulting in a beneficial impact to cultural resources.

Access. The indirect adverse impacts of access from development and OHV use under Alternative E are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative E proposes an increase in development compared to Alternative A (as represented by surface disturbance numbers in Table 4-1) and Alternative E designates the third highest acreage (along with Alternative D) to OHV use limited to existing roads and trails (1,162,244), an 11-percent decrease from Alternative A (1,311,715). These actions result in an indirect adverse impact to cultural resources; however, the impacts under Alternative E are similar in intensity to those identified under Alternative A.

Proactive Cultural Resource Management Actions. Proactive cultural resource management actions for the 1,633-acre Notches Dome Archeological District under Alternative E are the same as those identified under Alternative A. For sites 48NA227, 48NA940, 48NA84, Alternative E offers additional protection compared to Alternative A by maintaining an NSO restriction within the site boundaries and adding a CSU restriction on public lands within 300 feet of each site.

Under Alternative E, cultural resource inventories are conducted on the area of potential impact plus a buffer zone of at least 100 feet. Inventory boundaries are identified on a project-by-project basis. This management action results in a beneficial impact to cultural resources.

The minimum cultural resource block inventory size for Pine Ridge under Alternative E is 40 acres. Linear inventories will cover a minimum of 100 feet on either side of the surface disturbance. This

management action results in beneficial impacts to cultural resources. No similar action is identified for Pine Ridge in Alternative A. More area is inventoried for cultural resources under Alternative E than under Alternative A.

4.5.1.3 Conclusion

Allowable uses and management actions described in this section for the various alternatives are used to determine the potential impacts to cultural resources. Meaningful differences in surface-disturbing activities, land-tenure adjustments, access, and proactive management actions form the basis for the following conclusion. Impacts to cultural resources from the alternatives are anticipated to be similar in type, but different in intensity. Whereas proactive cultural resource management actions result in beneficial impacts across all alternatives, overall potential impacts to cultural resources under Alternative D are anticipated to be the most adverse. Potential impacts under Alternative B are anticipated to be the least adverse. Potential adverse impacts to cultural resources under alternatives C and E are anticipated to be similar in intensity and slightly less than Alternative A. Under all alternatives, the BLM continues its obligation to conduct government-to-government consultation with interested tribes. Actions required by the NHPA and the Wyoming State Protocol Agreement will form the foundation of all project-specific decisions regarding cultural resources. Conflicts between cultural resources and other resource uses not covered by the RMP will be resolved by the Wyoming State Protocol Agreement and provisions in the NHPA.

4.5.2 Paleontological Resources

Much of the land managed by the BLM have badlands topography or exposed bedrock, resulting in a higher potential for the discovery of fossil localities than on most private lands. Direct impacts to paleontological resources from RMP alternatives typically result from actions that physically alter, damage, or destroy fossils or their contexts. For example, any type of surface disturbance in an area containing fossil resources could have a direct impact by disturbing important paleontological values. These actions also may have an indirect impact by providing greater access to the area, which can bring increased vandalism, removal of materials, and inadvertent damage that could impact fossils or their contexts. Conversely, actions that result in data collection and preservation of paleontological resources can be considered beneficial impacts. Impacts from the designation of the Alcova Fossil Area as an ACEC or SMA are addressed in the Special Designations section of this chapter.

4.5.2.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Scientifically important fossils will continue to be found within the planning area.
- Adverse impacts to paleontological resources occur from physical damage or destruction of fossils, from loss of related scientific data, and from transfer from public ownership.
- Adverse impacts to paleontological resources from surface-disturbing activities occur primarily at the time the initial surface disturbance occurs. Therefore, it is valid to use the projected numbers for short-term surface disturbance to quantify impacts to paleontological resources. Erosion resulting from long-term surface disturbance also can adversely impact paleontological resources, but not to the extent of short-term surface disturbance.
- Development activities over the life of the plan are anticipated to be similar in intensity to the surface disturbance acres identified in Table 4-1.

4.5.2.2 Analysis of Alternatives

Allowable uses and management actions that could impact paleontological resources include all surface-disturbing activities, changes in ownership, visitor accessibility, OHV use, and proactive paleontological resource management actions.

Impacts Common to All Alternatives

The types of impacts projected to occur to paleontological resources as a result of the alternatives are similar; however, the intensity of impacts is anticipated to vary. Therefore, impacts to paleontological resources from surface-disturbing activities, changes in ownership, visitor accessibility, OHV use, and proactive paleontological resource management actions are described under individual alternatives.

Alternative A

Surface-disturbing Activities. Under Alternative A, surface-disturbing activities by resources identified in Appendix M could impact paleontological resources. Under Alternative A, the projected short-term surface disturbance (59,990 acres) from BLM actions results in the third highest disturbance acreage following alternatives E and D, respectively (refer to Table 4-1).

The intensity of impacts to paleontological resources from surface-disturbing activities under Alternative A is anticipated to be similar to the RFAs shown in Appendix M. Moreover, the impacts to paleontological resources from surface disturbance projected for Alternative A are anticipated to be primarily adverse. However, it should be noted that mitigation of adverse impacts often results in data collection and (or) preservation of paleontological resources, which could result in a small beneficial impact.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative A provide additional protection for paleontological resources. For example, under Alternative A, no surface use is allowed on slopes greater than 25 percent without permission of the authorized officer. This and other management actions of this type result in beneficial impacts to paleontological resources because they limit the potential for disturbance. However, fewer restrictions on surface-disturbing activities are provided for under Alternative A as compared to alternatives B, C, and E. Therefore, additional protection for paleontological resources under Alternative A is less than all other alternatives, except Alternative D.

Land Disposal and Acquisition. Disposal of public surface containing known or previously undocumented paleontological resources results in an adverse impact to paleontological resources due to the loss to the public of public fossils and the lack of protective measures for paleontological resources when under private ownership. Under Alternative A, 103,725 acres of public surface are identified for disposal. This is the lowest acreage identified for disposal under all the alternatives. Likewise, any acquisition of lands within the planning area that contains paleontological resources results in a beneficial impact to paleontological resources due to the protective measures offered under federal ownership and the gain of public fossils.

Access. General development (e.g., recreational facilities and mineral development) and OHV use result in increased access to public lands and, therefore, adverse impacts to remote paleontological resources occur. For example, paleontological localities are protected when there are access restrictions, but may be exposed to vandalism and erosion with increased access.

For the purpose of this analysis, development activities are anticipated to be similar in intensity to the surface disturbance acres identified in Table 4-1. Based on this assumption, it is anticipated that the third

highest amount of development and increase in access will occur under Alternative A and result in an indirect adverse impact to paleontological resources.

OHV use on public lands, under all alternatives, indirectly impacts paleontological resources. The impacts of OHV use are primarily anticipated to be adverse, indirect, and occur in the areas limited to existing roads and trails for OHV use. However, the existing OHV park (187 acres) contains important paleontological resources. Direct impacts from OHV use may be occurring. Indirect impacts from accelerated erosion and degradation due to exposure also may be impacting the site. The site is presently being researched and monitored to determine if OHV use is causing adverse impacts above the level of natural degradation. Although use is limited to existing roads and trails, new trails are constantly being created and become part of the "existing designation" throughout the planning area. For this reason, increased access to remote locations under this OHV designation is more likely to occur. Alternative A identifies the largest area (1,311,715 acres) for OHV use limited to existing roads and trails (Table 2-1).

Proactive Paleontological Resource Management Actions. Under Alternative A, current management practices continue. Existing management (permits, goal to acquire lands with high paleontological values, and requirements to assess and mitigate adverse impacts) result in beneficial impacts to paleontological resources. However, management actions under Alternative A generally are less protective than those under alternatives B, C, D, and E.

Alternative B

Surface-disturbing Activities. The impacts to paleontological resources from surface-disturbing activities under Alternative B are anticipated to be adverse and similar in type to Alternative A (as identified in Appendix M). However, the intensity of adverse impacts to paleontological resources from surface-disturbing activities under Alternative B is anticipated to be less than under Alternative A. Under Alternative B, the projected short-term disturbance acreage from BLM actions is the lowest of any alternative (refer to Table 4-1).

Relative to Alternative A and other alternatives, Alternative B incorporates the most restrictions on surface-disturbing activities. Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative B provide additional protection for paleontological resources. For example, under Alternative B, no surface use is allowed on slopes greater than 25 percent. This and other similar management actions result in beneficial impacts to paleontological resources because they limit disturbance to paleontological resources.

Land Disposal and Acquisition. The types of impacts expected to occur from disposal of public surface under Alternative B are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative B, 109,210 acres of public surface are identified for disposal; approximately 5-percent more than proposed under Alternative A. Disposal of public surface results in an adverse impact to paleontological resources and acquisition results in a beneficial impact, as described in Alternative A.

Access. The types of impacts anticipated to occur from development and OHV use under Alternative B are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative B proposes the least amount of development by alternative (as represented by surface disturbance numbers in Table 4-1) and provides the smallest area (909,651 acres) for OHV use limited to existing roads and trails; a 31-percent decrease from Alternative A (1,311,715 acres). These actions result in an indirect adverse impact to paleontological resources, but a less adverse impact than in Alternative A. Alternative B increases the size of the existing OHV park from 55 to 242 acres. If the additional acres

includes important paleontological resources, a proportionate increase in possible adverse impacts is expected.

Proactive Paleontological Resource Management Actions. Under Alternative B, no new interpretive facilities are constructed; additional stipulations on permits are considered on a case-by-case basis; the BLM proactively identifies and designates areas of high paleontological values and applies NSO restrictions, as needed; retains public surface with important paleontological values; requires on-the-ground surveys prior to approval of surface-disturbing activity or land disposal; and requires monitoring during disturbance on Class 3, 4, and 5 formations. These proactive management actions result in a beneficial impact to paleontological resources. The proactive management actions under Alternative B are more protective than those identified under Alternative A, and the most protective of all alternatives.

Alternative C

Surface-disturbing Activities. The impacts to paleontological resources from surface-disturbing activities under Alternative C are anticipated to be adverse and similar in type to Alternative A (as identified in Appendix M). However, the intensity of adverse impacts to paleontological resources from surface-disturbing activities under Alternative C is anticipated to be less than under Alternative A. Under Alternative C, the projected short-term disturbance acreage from BLM actions would result in the fourth highest disturbance acreage following alternatives D, E, and A, respectively (refer to Table 4-1).

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative C provide additional protection for paleontological resources. For example, under Alternative C, no surface use is allowed on slopes greater than 25 percent with highly erosive soils. This and other management actions of this type result in a beneficial impact to paleontological resources because they limit disturbance to paleontological resources.

Land Disposal and Acquisition. The types of impacts expected to occur from disposal of public surface under Alternative C are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative C, 241,364 acres of public surface are identified for disposal, which is approximately 233-percent more than proposed under Alternative A (103,725 acres). Disposal of public surface results in an adverse impact to paleontological resources and acquisition results in a beneficial impact, as described in Alternative A.

Access. The type of impacts anticipated to occur from development and OHV use under Alternative C are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative C proposes a decrease in development compared to Alternative A (as represented by surface disturbance numbers in Table 4-1) and Alternative C designates the third highest acreage (along with Alternative E) to OHV use limited to existing roads and trails (1,162,113 acres), an 11-percent decrease from Alternative A (1,311,715 acres). Under Alternative C, the existing OHV park increases from 98 acres to 285 acres. This may increase the adverse impacts, depending on whether the expansion area includes additional paleontological resources.

Proactive Paleontological Resource Management Actions. Under Alternative C, interpretive facilities are constructed, additional stipulations are added to permits on a case-by-case basis, public surface with scientifically important paleontological values is retained, and on-the-ground surveys prior to approval of surface-disturbing activity or land disposal are required, as is monitoring during disturbance on Class 4 and Class 5 formations. These proactive management actions would result in a beneficial impact to paleontological resources. The proactive management actions under Alternative C are more protective than those identified under Alternative A, but less protective than under Alternative B.

Alternative D

Surface-disturbing Activities. The impacts to paleontological resources from surface-disturbing activities under Alternative D are anticipated to be adverse and similar in type to Alternative A (as identified in Appendix M). However, the intensity of adverse impacts to paleontological resources from surface-disturbing activities under Alternative D are anticipated to be more than under Alternative A. Under Alternative D, the projected short-term disturbance acreage from BLM actions result in the highest disturbance acreage of all the alternatives (refer to Table 4-1).

Fewer restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) are provided under Alternative D; therefore, additional protection for paleontological resources under Alternative D are less than all other alternatives. For example, under Alternative D, surface disturbance on slopes greater than 25 percent is allowed. Under Alternative D, this management action results in an adverse impact to paleontological resources because it opens more BLM land to surface-disturbing activities. Compared to Alternative A, Alternative D is less protective of paleontological resources.

Land Disposal and Acquisition. The types of impacts expected to occur from disposal of public surface under Alternative D are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative D, 224,834 acres of public surface are identified for disposal; approximately 217-percent more than proposed under Alternative A (103,725 acres). Disposal of public surface results in an adverse impact and acquisition results in a beneficial impact to paleontological resources, as described in Alternative A.

Access. The types of impacts anticipated to occur from development and OHV use under Alternative D are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative D proposes an increase in development compared to Alternative A (as represented by surface disturbance numbers in Table 4-1) and the highest level of development of all alternatives. Alternative D designates the second highest acreage to OHV use limited to existing roads and trails (1,292,630 acres), a 1-percent decrease from Alternative A (1,311,715 acres). Alternative D, like Alternative C, includes expanding the existing OHV park from 98 acres to 285 acres. This may increase the adverse impacts, depending on whether the expansion area includes additional paleontological resources.

Proactive Paleontological Resource Management Actions. Under Alternative D, interpretive facilities are constructed, permits will include standard stipulations, public surface with scientifically important paleontological values are retained, surveys are required prior to approval of surface-disturbing activity or land disposal, and monitoring is required during disturbance of Class 4 and Class 5 formations. These proactive management actions result in a beneficial impact to paleontological resources. The proactive management actions under Alternative D are more protective than those identified under Alternative A, but less protective than under alternatives B, C, and E.

Alternative E (Preferred Alternative)

Surface-disturbing Activities. The impacts to paleontological resources from surface-disturbing activities under Alternative E are anticipated to be adverse and similar in type to Alternative A (as identified in Appendix M). However, the intensity of adverse impacts to paleontological resources from surface-disturbing activities under Alternative E are anticipated to be more than under Alternative A. Under Alternative E, the projected short-term disturbance acreage from BLM actions result in the second highest disturbance acreage following Alternative D (refer to Table 4-1).

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative E provide additional protection for

paleontological resources. For example, under Alternative E, no surface use is allowed on slopes greater than 25 percent without permission of the authorized officer and an NSO restriction is in place on slopes greater than 25 percent in the South Bighorns. These types of management actions result in beneficial impacts to paleontological resources because they limit disturbance to paleontological resources.

Land Disposal and Acquisition. The types of impacts expected to occur from disposal of public surface under Alternative E are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative E, 224,834 acres of public surface are identified for disposal; approximately 217-percent more than proposed under Alternative A (103,725 acres). Disposal of public surface results in an adverse impact and acquisition results in a beneficial impact to paleontological resources, as described in Alternative A.

Access. The types of impacts anticipated to occur from development and OHV use under Alternative E are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative E proposes an increase in development compared to Alternative A (as represented by surface disturbance numbers in Table 4-1), and Alternative E designates the third highest acreage (along with Alternative C) to OHV use limited to existing roads and trails (1,162,244 acres), an 11-percent decrease from Alternative A (1,311,715 acres). Alternative E includes expanding the existing OHV park by 98 acres from the existing situation discussed in Alternative A to 285 acres. This may increase the adverse impacts, depending on whether the expansion area includes additional paleontological resources.

Proactive Paleontological Resource Management Actions. Under Alternative E, interpretive facilities are constructed, additional stipulations are added to permits on a case-by-case basis, public surface with scientifically important paleontological values are retained, on-the-ground surveys prior to approval of surface-disturbing activity or land disposal are required, as is monitoring during disturbance on Class 3 formations. These proactive management actions result in a beneficial impact to paleontological resources. The proactive management actions under Alternative E are more protective than those identified under Alternative A, but less protective than under Alternative B.

4.5.2.3 Conclusion

Meaningful differences in surface-disturbing activities, disposal and acquisition, access, and proactive management form the basis for the following conclusion. Impacts to paleontological resources from the alternatives are anticipated to be similar in type, but differ in intensity. Proactive paleontological resource management actions result in beneficial impacts across all alternatives. Potential impacts to paleontological resources under Alternative D are anticipated to be the most adverse, whereas potential impacts from Alternative B are anticipated to be the least adverse. Potential adverse impacts to paleontological resources from alternatives C and E are anticipated to be similar in intensity and slightly less than Alternative A.

4.5.3 Visual Resources

This section describes the anticipated impacts of each alternative on VRM in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as beneficial or adverse with respect to visual resources.

Anything that draws the viewer’s attention and contrasts with the basic elements (form, line, color, or texture) of a given landscape, impacts the viewer’s perceptions, creating impact to the visual resources. Changes from any source that introduces intrusive elements into the existing landscape could impact visual resources. Direct impacts resulting from on-the-ground activities may be either adverse or beneficial. Adverse impacts include the addition of visual intrusions, such as roads and facilities, or the removal of natural materials (i.e., soil, vegetation). Beneficial impacts are normally a direct result of

post-disturbance reclamation efforts. Indirect impacts relate to the management of other resource values, in which specific actions may limit, as well as increase, the effectiveness of the VRM program. Actions that occur on lands not administered by the BLM (regardless of ownership) can impact the visual resources of the adjacent public lands. Maps 32 through 36 identify VRM by alternative.

4.5.3.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Future development and other land use activities described under each alternative are compared to recommended VRM classes and the existing visual conditions to determine potential impacts.
- To adequately describe potential impacts of each alternative in the context of the capacity for differing landscapes to absorb visual intrusions, actions potentially impacting visual resources were divided into general categories: high profile developments, low-profile or short-term projects, and resource management prescriptions.

4.5.3.2 Analysis of Alternatives

Allowable uses and management actions that could impact visual resources primarily include surface development and vegetation management. As visual resources are impacted by the alternatives, VRM can, in turn, impact other resources. The impacts of VRM on other resource topics (i.e., physical, biological, etc.) are discussed under the appropriate impacted resources.

Impacts Common to All Alternatives

The types of impacts projected to occur to visual resources as a result of the various alternatives are similar. However, the intensity of impacts is anticipated to vary by alternative; therefore, impacts to visual resources from surface development and vegetation management actions are described under individual alternatives.

An impact to the visual quality of the landscape occurs when a management activity creates noticeable surface disturbance that contrasts with form, line, color, or texture in the landscape. Typical management activities include vegetation management, range-improvement projects, or more intensive activities, such as oil and gas development and mining. Most oil and gas development is expected to occur in the Wind River and Powder River basins. Coal mining operations would most likely occur in northeastern portions of Converse County (Powder River Basin). Mining activities such as coal mining or limestone quarrying, which are large in scale relative to the landscapes in which they occur, create dominant long-term adverse visual impacts. Even when such activities meet the established VRM objectives, they should be mitigated, where possible.

Small-scale, dispersed development (range improvements, etc.) have a lesser impact, due to the ability to fit these facilities into natural landscapes. Visual resources in areas with a high potential for oil and gas development are likely to be more heavily impacted through the long term.

Alternative A

Visual Resource Management. Current VRM classes for the planning area were established with the Platte River Resource Area Oil and Gas Environment Assessment. Under current management, the majority of public land surface of the planning area is classified as VRM Class IV (953,543 acres), VRM Class III (210,258 acres), and VRM Class II (109,827 acres). The remaining public land surface acreage was former Class V (2,074+ acres) or was unclassified (85,875 acres). Current visual resource classes do not accurately reflect the visual quality of the planning area and do not account for existing land use, development, and other changes within the planning area.

Surface Development. Current management allows for large-scale disturbances, high-profile intrusions, and concentrated development. As a result, high-profile and concentrated development of nonrenewable resources is expected to continue in both the Wind River and Powder River basins under current management. Coal development outside the coal development potential areas is not addressed in Alternative A.

Vegetation Management. Short-term impacts associated with forest management include changes in the natural line, color, form, and texture of harvest areas, as well as the introduction of new visual intrusions, such as haul roads. These impacts are anticipated to adversely impact visual quality; however, long-term impacts diminish as forests regenerate.

Other forms of vegetation management under Alternative A are applied to varying plant communities in a limited fashion. The use of prescribed burns and wildland fire suppression could create adverse impacts to visual resources. Rehabilitation after burns is determined on a case-by-case basis. Fuel-reduction methods, such as mechanical, chemical, or biological vegetation treatments and the use of mosaic burn patterns, minimize impacts to visual resources.

Under Alternative A, adverse impacts to visual resources resulting from mechanical, chemical, or biological vegetation treatments are anticipated to be short-term. Long-term impacts from vegetation treatments will most likely be beneficial to visual resources. Alternative A allows for the greatest amount of visual degradation of the public lands in the Casper Field Office because it has the largest acreage managed under the Class IV objective.

Alternative B

Visual Resource Management. In this alternative, proposed VRM Classes for BLM-managed surface are as follows: 408,576 acres as Class II; 415,458 acres as Class III; and 537,543 acres as Class IV.

Surface Development. Relative to current management, large-scale disturbances, high-profile intrusions, and concentrated development are limited under Alternative B. For example, wind-energy development in the planning area is restricted to areas classified as power classes 6 and 7 (see Table 3-26).

Alternative B proposes the greatest acreage in Class II and the least acreage in Class IV of all the alternatives. Accordingly, it provides the greatest positive long-term impact to visual resources. Where projects were developed in Class II areas, a higher standard for mitigation of visual impacts is required. As a result, scenic quality is better protected.

Class II areas are considered ROW avoidance areas and do not allow cross-country placement of ROW facilities. In addition, the Oregon Trail Road ROW Corridor, Segment A, is replaced for the protection of this historic landscape. The new corridor is to be located along an existing pipeline route. These restrictions minimize adverse impacts to natural landscapes within areas containing sensitive resource values.

Vegetation Management. Vegetation management prescriptions under Alternative B further promote age and species diversity among differing plant communities, with an emphasis on mountain shrub, sagebrush, and forest communities. In addition, habitat fragmentation management actions limit and (or) restrict development in areas with low development potential for coal and oil and gas resources, with public surface ownership greater than 50 percent, and contiguous native vegetation blocks of greater than 10,000 acres. This restriction benefits VRM relative to Alternative A. Rehabilitation efforts following fire reduce impacts to areas impacted by suppression efforts. The long-term impacts to visual resources from management activities are anticipated to be beneficial.

Overall, Alternative B affords more protection to visual resources and results in fewer adverse impacts to visual resources than Alternative A. In addition, Alternative B considers existing conditions throughout the planning area and, therefore, increases the potential to achieve visual resource goals.

Alternative C

Visual Resource Management. Similar to Alternative B, this alternative proposes fewer acres of BLM-administered surface for VRM Class II and more for VRM Class III and IV. The acreage are as follows: Class II, 367,151 acres; Class III, 433,799 acres; and Class IV, 560,627 acres. Isolated 40-acre parcels contiguous to USFS property are managed to meet USFS visual objectives for those areas.

Surface Development. Relative to current management, large-scale disturbances, high-profile intrusions and concentrated development are somewhat restricted under Alternative C. For example, wind-energy development in the planning area is restricted to areas designated as power classes 3, 4, 5, 6, and 7 (see Table 3-26). Under Alternative C, coal development is limited to the existing CDPA and impacts to VRM are confined to that area. However, the remainder of the planning area has fewer restrictions on surface development than Alternative B, which allows for more visual intrusions and an increased contrast compared to Alternative B, but less than Alternative A. This alternative protects scenic quality better than Alternative A, less than Alternative B, and the same as Alternative E.

Alternative C is slightly less restrictive than Alternative B, but more restrictive than Alternative A. In addition, Alternative C has less acreage of expected long-term surface disturbance compared to Alternative A.

Restrictions on the types of facilities that could be placed in utility corridors are lifted, with the exception of the Oregon Trail Road ROW Corridor, Segment A. Restrictions along this corridor increase. Visual intrusions within important landscapes are limited; however, more adverse impacts to visual resources occur across the planning area.

Vegetation Management. Vegetation management under Alternative C is similar to the description under Alternative B, but realized on a smaller scale as the area managed is smaller. The management to limit habitat fragmentation still represents a beneficial impact to VRM compared to Alternative A. Alternative C allows clear-cuts up to 20 acres, with meandering boundaries, which has a greater impact on visual resources than the 5-acre clear-cuts under alternatives A and B. Priority on limited suppression tactics are employed to reduce the potential disturbance from heavy equipment use. Visual impacts resulting from both wildland and prescription fires are expected to be slightly less than those under alternatives A and B.

Overall, Alternative C affords more protection to visual resources and results in less adverse impacts to visual resources relative to Alternative A.

Alternative D

Visual Resource Management. Alternative D proposes fewer acres of BLM-managed surface in Class II than alternatives B and C, but more than Alternative A. Similarly, a larger portion of total surface acreage would be in Classes III and IV. The acreage are as follows: Class II, 205,542 acres; Class III, 548,780 acres; and Class IV, 607,255 acres.

Surface Development. Relative to current management, large-scale disturbances, high-profile intrusions, and concentrated development are expected to continue under Alternative D. For example, wind-energy development in the planning area is not restricted to areas designated as particular power classes (see Table 3-26). In addition, Alternative D allows for the most extensive resource development. As a result,

except for Alternative A, this alternative provides less protection for the visual values of BLM-administered lands than the other alternatives. Scenic quality is adversely impacted more and mitigation efforts are held to lower standards for much of the area.

This alternative poses the least restrictive management strategy in regard to preserving NHTs and Other Historic Trails, ROW, renewable energy facilities, and temporary projects that exceed contrast levels for the given VRM classes. Alternative D has the fewest surface development restrictions and the greatest potential for long-term surface disturbance (22,080 acres) from BLM actions compared to all other alternatives.

Vegetation Management. Under Alternative D, the impacts of mechanical, chemical, and biological vegetation treatments, excluding forest harvest and fire management, are similar to those under Alternative B. Clear-cutting could have greater impacts on visual resources compared to Alternative A because there are no restrictions on the size or shape of the cuts. Alternative D results in the greatest adverse impacts to visual resources from both large and small-scale projects. In addition, Alternative D has the greatest probability of the alternatives to exceed allowable visual impacts in Class II and III areas for the planning area.

Alternative E (Preferred Alternative)

Visual Resource Management. Alternative E is a compromise between Alternative D and existing management shown in Alternative A (Maps 32, 35, and 36). It proposes the same acreage for the three VRM Classes as Alternative C. The acreage by VRM Class are as follows: Class II, 367,151 acres; Class III, 433,799 acres; and Class IV, 560,627 acres.

Surface Disturbance and Development. Relative to current management, large-scale disturbances, high-profile intrusions, and concentrated development are somewhat restricted under Alternative E. For example, wind-energy development in the planning area is restricted to areas designated as power classes 3, 4, 5, 6, and 7 (see Table 3-26). Visual impacts from wind energy are greater than under Alternative B and less than Alternative D.

The impacts to visual resources are anticipated to be commensurate with development activities. Potential adverse impacts to visual resources from ROW facilities are similar to those anticipated under Alternative C.

Vegetation Management. Under Alternative E, the impacts of mechanical, chemical, and biological vegetative treatments are similar to those described under Alternative C. Under Alternative E, habitat fragmentation management is slightly less beneficial than under Alternative C, as the acreage protected is smaller, but still provides greater beneficial impact to VRM than under Alternative A.

Overall, Alternative E affords more protection to visual resources and results in less adverse impacts to visual resources relative to Alternative A.

4.5.3.3 Conclusion

With much of the BLM-administered minerals and surface ownership located within VRM Class IV areas, minimal restrictions on mineral development for protection of visual resources are anticipated under all alternatives. Alternatives B, C, and D are anticipated to limit the potential impact to visual resources. Under Alternative A, the direct impact to the visual setting associated with surface disturbance and facility development continues throughout the planning area and has the potential to impact areas that are highly valued by the public, such as cultural sites, historic trails, and recreational areas, to a greater

degree than all other alternatives. This conclusion is based on the outdated inventory under Alternative A.

Overall, Alternative B produces the least adverse impacts to VRM because other management actions under this alternative are restricted to certain geographic areas, cover proportionately less area, or are buffered from other resources, thus producing smaller, more localized disturbances to visual resources. Alternatives A and C are similar in that they allow slightly more disturbance compared to Alternative B, but still result in somewhat less adverse impacts to visual resources compared to Alternative D. Impacts to visual resources under Alternative E are less than Alternative D. The order of the alternatives in ascending degree of potential impact from the least adverse to the most adverse on visual resources is Alternative B, alternatives C and E, followed by alternatives D and then A.

4.6 Land Resources

The Land Resources section describes the potential impacts to lands and realty, renewable energy, ROWs and corridors, transportation, OHV use, livestock grazing, and recreation with respect to each alternative. Within each resource, impacts common to all alternatives and the methods and assumptions used for the analysis are described.

4.6.1 Lands and Realty

The following discussion highlights the primary differences between alternatives and their anticipated impacts on the lands and realty program. Included in the lands and realty program are land-tenure adjustments (e.g., sales, exchanges, acquisitions), land use authorizations (i.e., leases and permits), and withdrawals, classifications, and segregations. This section focuses on how other resources potentially impact the lands and realty program by limiting or preventing realty actions. Refer to Maps 37 through 41 for lands and realty.

The purpose of the lands and realty program is to facilitate management of the lands and resources of the Casper Field Office. The program adapts in accordance with changing land management and resource needs and issues. As such, lands and realty program actions generally result in beneficial impacts within the Casper Field Office with regard to multiple use objectives. In addition, the presence of other resources have the potential of preventing lands and realty actions from being carried out and, thus, they are considered adverse impacts on the lands and realty program.

The only type of direct impacts to the lands and realty program occurs when other resources are present preventing or making it or making it considerably more difficult to complete a transaction. For example, mitigating resource values required for a land-disposal transaction substantially increases processing costs and timeframes required to complete the transaction and temporarily delay the transaction; this would be considered a long-term impact. Generally, there are no indirect impacts to the lands and realty program. Most adverse impacts possibly occurring to other resources as a result of lands and realty actions would be long-term. A direct impact to another resource as a result of the lands and realty program is a land classification precluding the use of that land for mining. An indirect impact could result from the impacts of development (e.g., noise) on disposed of lands. The most beneficial impacts to other resources associated with lands and realty actions would be direct and long-term. For example, acquisition of lands for the purposes of improving resource conditions would be a permanent transaction, yielding a long-term beneficial impact. Similarly, disposal of lands to consolidate lands within the Casper Field Office also would be a permanent transaction yielding long-term beneficial impacts.

4.6.1.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The demand for land tenure adjustments will increase, but the BLM's ability to respond or to satisfy increased demands for land sales and exchanges will be limited by budget and by personnel constraints into the foreseeable future.
- Land acquisition is a support function for resources programs (e.g., cultural resources, fish and wildlife, recreation). The priority or the urgency associated with any acquisition is established by the resource program benefiting from the acquisition.
- Land-tenure adjustments (e.g., disposal, acquisition) focus on disposing scattered parcels within eastern Converse, Platte, and Goshen counties and acquiring lands in Natrona and western Converse counties to consolidate ownership and improve management opportunities.

- In general, all public lands are managed under BLM's existing guidance and established policy. The lands and realty program follows existing guidance when disposing of public lands or when acquiring lands to support BLM management programs. When existing policy or guidance makes it difficult to complete a transaction or when mitigation is required for a land-disposal transaction, these restrictions are considered adverse impacts to the lands and realty program.
- The number of land use authorizations will increase over the life of the plan.
- Existing withdrawals to other federal agencies (i.e., USFWS, the U.S. Bureau of Reclamation [USBR], DOE, USFS, the Federal Aviation Administration [FAA], the National Park Service [NPS], and the Federal Energy Regulation Commission, [FERC]) will continue.
- The resource programs having the most potential to affect lands and realty include: cultural resources, fish and wildlife, special status species (wildlife, fish, and plants), riparian vegetation and wetland communities, water resources, recreation, and special designations.

4.6.1.2 Analysis of Alternatives

Allowable uses and management actions having the potential to adversely impact lands and realty primarily include restrictions which prohibiting or delaying lands and realty transactions. For example, lands and realty actions that benefit one or more resources or programs may result in adverse impacts to others.

Impacts Common to All Alternatives

The lands and realty program alternatives identify a broad range of actions which can directly and indirectly change existing land uses (Maps 37 through 41). Land disposal to private entities or local governments could result in some lands being available for future development. Land use authorizations could authorize a variety of uses on public lands. Withdrawals set aside, withhold, or reserve public lands for public purposes that could prevent certain land use changes and development.

Under current conditions, large-scale changes in land use are not expected to occur. Any public lands transferred out of federal ownership are typically -used for the same or similar purposes as they are currently used. Urban expansion f is one of the most probable large-scale land use changes but, most communities in the planning area, aside from the Midwest and Edgerton areas, are surrounded by large areas of private land. The large amount of private land is expected to satisfy the demand for community growth and expansion over the life of the plan. These land use changes would be coordinated with local governments in consideration of existing land use plans and policies (e.g., county comprehensive plans).

Land exchanges, sales, and purchases, would help to consolidate the relatively fragmented public land ownership pattern within the planning area and allow for better management of public lands over the long term. Consolidating public land holdings improves access to public lands reducing the number of access easements needed and helping to reduce encroachment problems from adjacent property owners. These impacts are considered beneficial impacts. Land use authorizations include leases and permits under Section 302(b) of the Federal Land Policy and Management Act (FLPMA) for various activities including habitation, cultivation, and trade and manufacturing uses; airport leases; and R&PP (Recreation and Public Purposes Act) leases and conveyances. Historic low demand for leases, permits and airport leases is expected to continue. Demand for R&PP leases and conveyances will be needed to meet the land needs of communities and nonprofit groups.

Withdrawals, Classifications and Segregations Impacts

Table 4-13 summarizes withdrawals, classifications, and other segregations by alternative. These actions are generally beneficial to resources, resource uses, and special designations because they prohibit land

disposal and exclude mining location or some additional form of mineral development. Withdrawals, classifications, and other segregations of lands suspend them in whole or in part from the operation of public land and (or) mineral laws. Operations under the mining laws are not discretionary actions with the Secretary of the Interior. Segregation is the act or action applied to prohibit operations under the mining law and an underlying reason for withdrawals, classifications, and other segregations. Mineral material disposal and mineral leasing are discretionary actions, andno existing or proposed withdrawal segregates from disposal of mineral materials. Only in rare instances does a withdrawal segregate against mineral leasing. The four occurrences of segregation from mineral leasing are (1) Naval Petroleum Reserve No. 3, where oil and gas extraction occurs under authority of the DOE, and all such mineral production is Congressionally directed; (2) Fort Laramie National Historic Site, where oil and gas leasing is incompatible with preservation and management of the unique resources at this historic site; (3) Camp Guernsey, where oil and gas leasing and development is incompatible with military training exercises, including heavy artillery use and the presence of unexploded ordinance; and (4) Spook Site Mills Tailings, where oil and gas exploration could compromise the purpose of the withdrawal; (i.e., consolidating, containing, and controlling radioactive mill tailing wastes). Public lands withdrawn to enlarge Fort Laramie or Camp Guernsey, and lands considered to be withdrawn for the Umetco Mills tailings area under the alternatives, also segregate from mineral leasing. In most instances, mining is prohibited on withdrawn lands.

Alternative A

Land-Tenure Adjustment Impacts

Under Alternative A, approximately 1,248,068 acres of land within the planning area are identified for retention and management, whereas 103,725 acres are identified for standard disposal, and 9,784 acres are identified for restricted disposal (see Map 37). Public lands around communities are disposed of on a case-by-case basis to meet community expansion needs. Lands needed for community expansion are sold or transferred under the R&PP Act. The BLM also pursues acquisition of land in identified areas. The BLM acquires lands and interests in lands in areas of high recreation or paleontological value, with sensitive cultural resources, areas with important fish and wildlife habitats, and along historic trail segments. The primary method for acquiring land is to complete land exchanges as opportunities arise or in some instances outright purchases are pursued. Public land tracts not critical to current management objectives are disposed of to acquire land in these areas as exchange opportunities arise.

Land-tenure adjustments consolidate and reduce fragmented ownership of lands within the planning area, thereby improving management of public lands. Disposing of scattered and isolated parcels reduces management costs, and eliminates inefficiencies. Land disposal may benefit ongoing development of private lands by making additional lands available. Future development of these disposal lands has a potential indirect, long-term impact on other resource programs, but not on the lands and realty program. Several resources, resource uses, and special designations could impact proposed land disposal actions by either delaying a final decision or by preventing the proposed transfer. Prior to each disposal action, inventories for cultural resources, fish and wildlife, special status species (wildlife, fish, and plants), riparian vegetation and wetland communities, water resources, recreation, and mineral resources are completed. In addition disposal actions are reviewed to determine whether they occur within special management areas. If any of these resources or special management areas are present, mitigation may be required or the proposed disposal may be prohibited. Disposal actions may be revised or modified to avoid impacts. Changing disposal actions can increase processing costs and timeframes, generally resulting in direct long-term impacts to the lands and realty program. Restricted disposal parcels recognize the presence of important resources, resource uses, or special management areas, and require inclusion of restrictions in the disposal.

Table 4-13. Summary of Withdrawals, Classifications, and Other Segregations by Alternative (Acreage)

Resource	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)	Segregates/Withdraws from		
						Disposal	Leasables	Locatables
SPECIAL MANAGEMENT AREAS								
Alcova Fossil Area*	1,613	6,913	5,805	0	5,805	Yes	No	Yes
Cedar Ridge TCP*	0	19,637	4,058	0	4.058	Yes	No	Yes
Jackson Canyon*	11,104	11,104	11,104	11,104	11,104	Yes	No	Yes
North Platte River	3,226	3,226	3,226	3,226	3,226	Yes	No	Yes
Sand Hills Management Area*	0	17,601	17,601	0	17,601	Yes	No	Yes
South Bighorns/Red Wall*	0	216,459	309,854	0	75,913	Yes	No	Yes
RESOURCE PROTECTION								
Bald Eagle Roosts (excludes Jackson Canyon)*	37,290	37,290	37,290	37,290	37,290	Yes	No	Yes
Fremont Canyon C&MU	0	1,261	0	0	1,261	Yes	No	Yes
Habitat Fragmentation*	0	580,007	238,724	0	168,386	Yes	No	Yes
Muddy Mountain C&MU	1,027	1,027	1,027	0	1,027	Yes	No	Yes
National Historic and Other Historic Trails*	0	924,153	253,614	0	253,614	Yes	No	Yes
Public Water Reserves	1,389	1,389	1,389	0	1,389	Yes	No	No
Stock Driveways	101,636	101,636	56,328	0	56,328	Yes	No	No
Table Mountain, Bump-Sullivan and Springer C&MU and Rawhide	2,018	2,201	0	0	0	Yes	No	Yes
CLASSIFICATIONS								
Coal Classifications	417,000	417,000	417,000	0	0	Yes	No	Yes
R&PP Classification	3,468	3,468	3,468	623	3,468	Yes	No	Yes
OTHER SEGREGATIONS								
Exchange Land	10,566	10,566	10,566	0	0	No	No	Yes
Sale Land	1,219	1,219	1,219	0	0	No	No	Yes
OTHER FEDERAL AGENCY WITHDRAWALS								
Air Navigation Site (FAA)	198	198	198	198	198	Yes	No	Yes
Camp Guernsey	5,620	11,850	11,850	5,620	11,850	Yes	Yes	Yes
Fort Laramie National Historic Site (NPS)	792	940	940	940	940	Yes	Yes	Yes
Grey Reef Power Site (FERC)	29	29	29	29	29	Yes	No	Yes
Mill Tailings Spook (DOE)	90	90	90	90	90	No	Yes	Yes
Mill Tailings UMETCO*	0	987	987	987	987	Yes	Yes	Yes
National Forests (USFS)	81,768	81,768	81,768	81,768	81,768	Yes	No	No
Thunder Basin National Grasslands (USFS)	163,238	163,238	163,238	163,238	163,238	Yes	No	No
National Wildlife Refuge (USFWS)	7,458	7,458	7,458	0	7,458	Yes	No	Yes
Naval Petroleum Reserve Number 3 (DOE)	9,324	9,324	9,324	9,324	9,324	Yes	Yes	Yes
Reclamation (USBR)	18,078	18,078	18,078	18,078	18,078	Yes	No	Yes

Notes: Alternative A reflects existing withdrawals and withdrawals proposed in the current plan.

* Areas not listed in Table 3-25 because they are not existing withdrawals.

C&MU Classification and Multiple Use Act of 1964
DOE U.S. Department of Energy
FAA Federal Aviation Administration
FERC Federal Energy Regulatory Commission
HMP Habitat Management Plan
No. Number
NPS National Park Service
R&PP Recreation and Public Purposes
TCP Traditional Cultural Property
USBR U.S. Bureau of Reclamation
USFS U.S. Forest Service
USFWS U.S. Fish and Wildlife Service

Land Use Authorization Impacts

Under Alternative A, the Casper Field Office responds to specific proposals for land use authorizations on a case-by-case basis. Similar to land-tenure adjustments, resources, resource uses, and special management areas potentially impact land use authorizations. During processing an inventory is completed to determine the presence of cultural resources, fish and wildlife, special status species (wildlife, fish and plants), riparian vegetation and wetland communities, water resources, recreation, and mineral resources. If any of these resources or special management areas are present, mitigation may be required or the proposal may be prohibited. Disposal actions may be revised or modified to avoid impacts. Change these actions can increase processing costs and timeframes, generally resulting in direct, long-term impacts to the lands and realty program. The limited demand for land use authorizations is anticipated to have minimal impact on the lands and realty program.

Alternative B

Land-Tenure Adjustment Impacts

Under Alternative B, about 1,236,083 acres of land within the planning area are identified for retention and management, whereas 109,210 acres are identified for standard disposal and 16,344 acres are identified for restricted disposal (see Map 38). In addition, public lands around communities are disposed of on a case-by-case basis to meet community expansion needs, but only when there are critical needs that must be met. Under Alternative B, the BLM pursues acquisition of land in all areas described under Alternative A, as well as lands on Cedar Ridge and along the 13-mile stretch between Fort Laramie and Guernsey. The BLM also pursues acquisition of lands and interest in lands with high paleontological values, sensitive resources, and historic trail segments to enhance resource management opportunities. Due to the similarity of the proposed lands and realty actions, impacts to land disposal under Alternative B are similar to those described for Alternative A.

Land Use Authorization Impacts

Under Alternative B, land use authorizations are prohibited with the exception of sites required to meet critical management needs. It is anticipated that demand for land use authorizations would be the same as under Alternative A, but fewer proposals would meet the critical management criteria. Under Alternative B other resources, resource uses, and special management areas have similar, but smaller, impact on the lands and realty program compared to Alternative A.

Alternative C

Land-Tenure Adjustment Impacts

Under Alternative C, approximately 1,114,064 acres of land within the planning area are identified for retention and management, whereas 241,364 acres are identified for standard disposal and 6,149 acres are identified for restricted disposal (see Map 39). Also, public lands within a 5-mile buffer of communities are disposed of on a case-by-case basis to meet community expansion needs. Under Alternative C, BLM pursues acquisition of all lands described under alternatives A and B, except no lands are acquired at Table Mountain. Due to an additional 137,639 acres of land identified for disposal, impacts to land disposal under Alternative C are similar but greater than those described for Alternative A.

Land Use Authorization Impacts

Under Alternative C, land use authorizations are allowed to meet public demand and evaluated on a case-by-case basis. Impacts on the lands and realty program under Alternative C are similar to Alternative A.

Alternative D

Land-Tenure Adjustment Impacts

Under Alternative D, about 1,131,290 acres of land within the planning area are identified for retention and management, whereas 224,834 acres are identified for standard disposal and 5,453 acres are identified for restricted disposal (see Map 40). Also, public lands within a 5-mile buffer of communities are disposed of on a case-by-case basis to meet community expansion needs. Under Alternative D, land acquisition occurs on a case-by-case basis as identified by BLM resource program needs, including lands with high paleontological values, sensitive cultural resources, and historic trail segments. Due to an additional 121,109 acres of land identified for disposal and additional lands identified on a case-by-case basis, impacts to land disposal under Alternative D are similar but greater than those described for Alternative A.

Land Use Authorization Impacts

Under Alternative D, land use authorizations are allowed to meet public demand and evaluated on a case-by-case basis. Impacts on the lands and realty program under Alternative D are similar to Alternative A.

Alternative E (Preferred Alternative)

Land-Tenure Adjustment Impacts

The acreage for retention, disposal, and restricted disposal under Alternative E are the same as those proposed under Alternative D (see Map 40). Public lands within a 5-mile buffer of communities are disposed of on a case-by-case basis to meet community expansion needs. Under Alternative E, land acquisition occurs through exchange, purchase, or donation as identified by BLM resource program needs, including lands with high paleontological values, sensitive cultural resources, and historic trail segments. Due to an additional 121,109 acres of land identified for disposal and additional lands identified on a case-by-case basis, impacts to land disposal under Alternative E are similar to Alternative D and greater than those described for Alternative A.

Impacts from other resources, resource uses, and special designations would likely increase under Alternative E (similar to Alternative D) as compared to Alternative A because Alternative E seeks to dispose of an additional 121,109 acres of identified lands, as well as additional lands on a case-by-case basis.

Land Use Authorization Impacts

Under Alternative E, land use authorizations are allowed to meet public demand and evaluated on a case-by-case basis. Impacts on the lands and realty program under Alternative E are similar to alternatives A and D.

4.6.1.3 Conclusion

Disposal and land use authorizations are the only aspects of the lands and realty program with the potential for adverse impact under the alternatives. The impacts from alternatives, as reflected by the acreage of lands identified for land disposal, are C, D, and E, B, and A in decreasing order.

4.6.2 Renewable Energy

Actions occurring through implementing each alternative potentially could affect renewable energy. Direct impacts on renewable energy include management actions permitting or prohibiting renewable energy development. Market demand will drive the development of renewable energy sources on public lands in the planning area. Indirect beneficial impacts on renewable energy sources include management

actions encouraging or facilitating renewable energy development. Indirect adverse impacts include management actions constraining renewable energy development.

In general, public utilities and private interests will develop renewable energy facilities based on market demand. Wind-energy development, the fastest growing sector of the renewable energy market, has recorded consistent growth of more than 20 percent over the last 10 years (E-Composites 2003). Many initiatives both in the public and private sectors have increased renewable energy production in Wyoming, with 284.65 megawatts of current installed renewable capacity (GAO 2004; Energy Atlas 2004). Solar and biomass energy development are not projected to impact available renewable energy resources in the planning area; therefore, wind energy is the primary focus of this analysis. Refer to Map 42 for renewable energy.

4.6.2.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Wind-energy development is expected to increase, relating directly to energy prices, national policy involving renewable energy, and other factors that encourage demand for alternative energy sources.
- Future wind-energy development proposals on BLM-administered lands within the planning area are subject to the decisions and policy developed in the BLM's *Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States* (BLM 2005h). The EIS proposes a Wind Energy Development Program that implements policies and BMPs for ensuring impacts of wind-energy development on BLM lands are kept to a minimum.
- Individual pieces of public land within the planning area have varying wind-energy potentials: 146,129 acres with outstanding/superb potential, 999,468 acres with fair, good, or excellent potential; and 215,980 acres with poor or marginal potential.
- The acreage with the potential for-wind energy development are relatively large compared to the current demand. Market demand, rather than BLM policy, will be the primary future constraint on wind-energy development. The utility companies will use economic data to plan for future wind-energy development.
- For analysis purposes, the national wind-energy capacity is projected to increase to 48,000 megawatts or more by 2025 (GAO 2004).
- The mapping of wind-energy potential areas is based on a large-scale nationwide mapping process likely to show a large margin of error if used for specific project location and prioritization of available renewable energy development sites.

4.6.2.2 Analysis of Alternatives

Allowable uses and management actions potentially impacting renewable resources are described as impacts common to all alternatives and specific to individual alternatives.

Impacts Common to All Alternatives

The types of impacts projected to occur to renewable energy as a result of the various alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative. Therefore, impacts to renewable energy are described under individual alternatives (Maps 43 through 47).

Resource management actions, other than those associated with the renewable energy program itself, potentially affecting renewable energy include vegetative resources, visual resources, cultural resources, historic trails, wildlife resources, and ROW and corridors. In general, managing these resources could potentially constrain renewable energy development. Specifically, renewable energy development would be restricted due to habitat fragmentation.

Alternative A

Under Alternative A, the BLM responds to specific proposals for renewable energy on a case-by-case basis, with no limitations based on wind-energy potential. Wind-energy development is constrained by existing management policies and prohibitions involving lands with high resource values.

Approximately 429,294 acres of public land is available for wind-energy development without use limitations. On 723,619 acres of public land, wind-energy uses are restricted in a minor way (e.g., seasonal restriction). The areas unavailable for location of any wind-energy development, also called wind-energy ROW exclusion areas, would affect 208,664 acres of public land.

Under Alternative A, direct impact to renewable energy development increases administrative costs due to the increased time associated with environmental data gathering under the case-by-case permitting process. Direct impacts also may include possible increases in the complexity of infrastructure to support more dispersed renewable energy development.

Alternative B

Under Alternative B, approximately 146,129 acres of BLM surface land are available for wind-energy development. This acreage represents those areas classified only as having outstanding/superb wind-energy potential. Wind-energy development is further constrained by various management policies and prohibitions involving lands with high resource values (e.g., measures to protect habitats, historic trails, and visual resources).

Under Alternative B, restrictions are greater for renewable energy development than under Alternative A. Approximately 27,005 acres of public land are available for wind-energy development without use limitations. Minor restrictions (e.g., seasonal restriction) to wind-energy development would be implemented on 29,768 acres of public land. The areas unavailable for location of any wind-energy development, also called ROW exclusion areas for wind development, would be greater than Alternative A and affect 89,356 acres of public land.

Under Alternative B, administrative costs and infrastructure complexity associated with wind-energy development is reduced. If Alternative B leads to concentrating renewable energy development, it also could reduce the costs of operation and maintenance of facilities within the planning area.

Alternative B limits wind-energy development on public land more than Alternative A and other Action Alternatives because of VRM program constraints. Indirect benefits for the local economy would result from diversification of local energy sources. These constraints may prompt interested developers to bypass public land in favor of private lands in the planning area.

Alternative C

Alternative C allows wind-energy development in areas identified as having outstanding/superb and good/excellent/fair wind-energy potential (1,145,597 acres) in the planning area.

Alternative C has greater restrictions on wind-energy development compared to Alternative A, but less than Alternative B. Approximately 307,560 acres of public land are available for wind-energy development without use limitations. On 276,287 acres of public land, wind-energy uses are restricted in a minor way (e.g., seasonal restriction). The areas unavailable for location of any wind-energy development affect 561,750 acres of public land.

Alternative D

Alternative D actively markets renewable energy development in the planning area on all public lands without regard to wind-energy potential and responds to specific proposals on a case-by-case basis. Alternative D allows wind-energy development in areas identified as having outstanding/superb and good/excellent/fair wind-energy potential (1,145,597 acres) in the planning area.

Approximately 541,230 acres of public land are available for wind-energy development without use limitations. Minor restrictions (e.g., seasonal restriction) to wind-energy development would be implemented on 422,761 acres of public land. Approximately 181,606 acres of public land are unavailable for location of any wind-energy development.

Direct impacts under Alternative D includes a decrease in revenues to the U.S. Treasury (general fund) as a result of cost reimbursement or rental reductions and (or) waivers, increased costs to developers due to the increased need for and time associated with environmental data gathering under the case-by-case permitting process, and possible increased management, maintenance, and infrastructure development of dispersed facilities.

Alternative E (Preferred Alternative)

Alternative E opens 146,129 acres of public lands identified as having outstanding/superb and 999,468 acres good/excellent/fair wind-energy potential for wind-energy development. Under Alternative E, the BLM responds to specific solar energy development proposals on a case-by-case basis. Also under Alternative E, the potential administrative costs and infrastructure complexity could be reduced. If Alternative E leads to concentrating renewable energy development, it may also reduce the costs of operation and maintenance of facilities within the planning area. With respect to other resource management, wind-energy development may be constrained by implementing various BLM programs. For example, VRM programs under Alternative E, including viewshed management for considerable cultural resources, could constrain wind-energy development.

Approximately 324,013 acres of public land are available for wind-energy development without use limitations. Wind-energy uses are restricted on 458,006 acres of public land in a minor way (e.g., seasonal restriction). The areas unavailable for location of any wind-energy development affects 363,578 acres of public land.

Indirect beneficial impacts for the local economy result from diversification of local energy sources; however, constraints limiting wind-energy development to specific areas may prompt interested developers to bypass public land in favor of private lands in the planning area.

4.6.2.3 Conclusion

Public utilities or private interests develop wind energy based on general market demand and the constraints placed on energy development opportunities in the planning area. In general, alternatives B, C, and E are the most constraining to wind-energy development, while alternatives A and D are the least constraining. However, because areas suitable for wind-energy development exceed current demand, it is expected that market demand, rather than BLM policy, is the primary constraint of wind-energy development.

4.6.3 Rights-of-Way and Corridors

The purpose of the ROW and corridors program is to provide routes needed to cross public lands. Impacts to ROW and corridors include restrictions on accommodating new facilities.

Impacts to ROW include restrictions on accommodating new facilities, possible restrictions on ROW uses, and, to some degree, changes in permitting timeframes, including restrictions protecting resource values, special designations (e.g., ACECs), economics, and recreation areas.

4.6.3.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- ROW increase in conjunction with expanded oil and gas, utility, and communication development.
- Corridors and communication site windows, also called ROW use areas, are designated as the preferred future locations for ROW and can be designated only in an RMP or plan amendment.
- ROW for smaller distribution facilities for minerals development and transportation, power and telephone services, and access roads are expected to remain at current levels, but could fluctuate with the degree of development.

4.6.3.2 Analysis of Alternatives

Allowable uses and management actions potentially impacting ROW and corridors are described as impacts common to all alternatives and impacts specific to individual alternatives.

Impacts Common to All Alternatives

The types of impacts projected to occur to ROW and corridors as a result of the various alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative. Therefore, impacts to ROW and corridors are described under individual alternatives.

The difference between the five alternatives involves the level of development resulting from other land uses and primarily oil and gas development, as well as the levels of restrictions (avoidance and exclusion areas) on the locations of ROWs. All alternatives include restrictions on surface-disturbing land uses, including ROWs. Corridors could beneficially impact on oil and gas development and major utility projects. Major transporting pipelines would benefit from placement in a corridor where land use conflicts have been eliminated or reduced. Designated corridors are intended to reduce resource and land use conflicts as much as possible. The corridors (ROW use areas) included in the alternatives are all considered viable, with few known conflicts.

ROWs concentrated in a corridor tend to localize or confine disturbance to a smaller area and prevent disturbance in areas identified as sensitive.

Alternative A

Under Alternative A, the restrictions or limitations placed on ROW and corridors by BLM management actions would not change. Current management accommodates new ROWs on a case-by-case basis. No new corridors are planned under Alternative A.

Impacts under Alternative A could include longer routes from new major facilities based on preferred corridor alignment for those ROWs, resulting in a possible increase in the cost of construction. Increased environmental data gathering and analysis for ROW proposals outside the identified corridors also could

increase overall cost. Direct impacts to new communication sites might increase time for permitting and possible increased environmental data gathering and analyses if designated sites cannot be used. Short-term direct impacts to shorter ROWs may result in a longer route as a result of requiring alignment in corridor fashion alongside existing ROWs. The proposed ROW corridors under Alternative A are consistent with the Western Utility Group (WUG) study described in Chapter 3.

Under Alternative A, 92,113 surface acres of public land are committed to newly designated ROW corridors as the preferred locations for major ROW uses and ROW use areas for communication sites. Approximately 429,294 acres of BLM-administered surface lands are open to ROWs without use limitations (except for standard stipulations associated with the construction of ROWs such as BMPs). Areas where ROW uses are restricted in a minor way (e.g., seasonal restrictions for wildlife habitats), called ROW avoidance areas include 723,619 acres of BLM-administered surface lands (see Map 43). Areas unavailable for location of any ROWs, called ROW exclusion areas, include 208,664 acres of BLM-administered surface lands. Indirect impacts to ROW and corridors under Alternative A could include economic impacts from the preference for locating major ROW within designated corridors (versus more direct routes).

Alternative B

Under Alternative B, the Oregon Trail Road ROW Corridor, Segment A, is removed and the Cabin Creek Corridor added. All ROWs would be required to be located within designated corridors or communication site windows. The proposed ROW corridors under Alternative B are consistent with the WUG study described in Chapter 3.

Alternative B provides expedited permitting processes for applicants requesting to locate facilities along the designated corridors and at the designated communication sites. However, Alternative B is more prohibitive than Alternative A and the most prohibitive of all alternatives with respect to shorter, individual ROW activities with all ROWs being restricted to locations within designated corridors.

Indirect economic impacts may be felt by future ROW users with the loss of the Oregon Trail Road ROW Corridor, Segment A. Under Alternative B, no ROWs located outside a designated ROW corridor (or use area) could be approved, creating adverse economic and social impacts to smaller ROW users, as well as failing to provide ROWs for development or transportation of minerals not located near existing ROW corridors.

Under Alternative B, 110,437 surface acres of public land are committed to designated ROW corridors as the required locations for all ROW uses. Approximately 94,592 acres of BLM-administered surface lands are available for ROWs without use limitations (except standard stipulations). Areas where ROW uses are restricted in some minor way include 167,379 acres of BLM-administered surface lands (see Map 44). ROW exclusion areas impact 1,099,606 acres of BLM-administered surface lands.

Alternative C

Under Alternative C, management encourages ROWs to route in corridor fashion, but also provides for case-by-case evaluations of all ROW projects. While existing corridors would continue, restrictions on uses of all but one corridor segment would be removed. The proposed ROW corridors under Alternative C would be consistent with the WUG study described in Chapter 3, similar to alternatives A and B.

Surface ROW facilities are restricted, but not prohibited, in the Oregon Trail Road ROW, Segment A. Under Alternative C, case-by-case site evaluations are implemented, resulting in impacts to uses of communication sites similar to Alternative A.

Alternative C could result in adverse economic impacts to companies wanting to add aboveground facilities along the Oregon Trail Road ROW corridor, Segment A. Indirect impacts to smaller ROW users are similar to Alternative A.

Under Alternative C, 92,113 surface acres of public land are committed to designated ROW corridors as the preferred location for major ROW uses. Approximately 373,626 acres of BLM-administered surface acres are available for all ROWs without use limitations (except standard stipulations). Areas where ROW uses are restricted in some minor way include 311,758 acres of BLM-administered surface lands (see Map 45). ROWs exclusion areas affect 676,193 acres of BLM-administered surface lands.

Alternative D

Alternative D allows the most energy development with the least constraints. Under Alternative D, all corridor and communication site window designations are removed and ROW facility locations are unconstrained to corridors. Alternative D increases the potential for resource conflicts (e.g., cultural resources) and the need for gathering or verifying environmental data, as well as increase the time added to permit new ROWs. By eliminating corridor designations, Alternative D is not consistent with the WUG study described in Chapter 3.

Economically, parties interested in developing ROWs could benefit from the ability to locate anywhere in the planning area; however, these benefits might be offset by increased costs for environmental analysis and permitting.

Under Alternative D, approximately 633,642 acres of BLM-administered surface area are available for all ROWs without use limitations (except standard stipulations). Areas where ROW uses are restricted in a minor way include 489,922 acres of BLM-administered public land (see Map 46). ROW exclusion areas affect 238,013 acres of BLM-administered surface lands.

Alternative E (Preferred Alternative)

Under Alternative E, existing corridors remain in place, but restrictions on types of uses in those corridors could be removed on a case-by-case basis. Similar to Alternative A, communication sites are the preferred location, with eight windows (or use areas) designated under Alternative E. However, as under Alternative A, additional communication sites outside these areas could be allowed on a case-by-case basis. Alternative E allows the most flexibility for ROW projects of all kinds, while taking advantage of the benefits provided by corridor designations. The proposed ROW corridors under Alternative E are consistent with the WUG study described in Chapter 3 (Map 47).

Similar to Alternative C, Alternative E could result in adverse economic impacts to companies wanting to add aboveground facilities along the Oregon Trail Road ROW Corridor, Segment A. In addition, a new corridor, the Cabin Creek Corridor, is designated. Indirect impacts to shorter ROWs are similar to Alternative A.

Under Alternative E, 115,885 surface acres of BLM-administered land is committed to designated ROW corridors. Approximately 379,738 acres of BLM-administered surface lands are available for all ROWs without use limitations (except standard stipulations). Areas where ROWs uses are restricted in a minor way include 539,799 acres of BLM-administered surface lands. ROW exclusion areas affect 442,040 acres of BLM-administered surface lands.

4.6.3.3 Conclusion

For the most part, major ROW uses could be accommodated by designated corridors traversing through the planning area. The areas closed to occupancy in the planning area are not so extensive that they could not be bypassed by major ROWs. Some additional project costs, however, may result.

Alternative D results in the least constraints and, therefore, the fewest adverse impacts on ROW use. Alternative D also provides the most acreage for ROWs without use limiations of all alternatives. Alternative C provides designated corridors with the least restrictions for major ROW uses and case-by-case analyses for new ROWs. Alternative B is most restrictive in terms of accommodating new ROWs, and would preclude ROWs located outside a designated corridor. In terms of least potential adverse impacts to most potential adverse impacts to ROW and corridors, the alternatives rank as follows: Alternative D, followed by alternatives A, C, and E, and then Alternative B.

4.6.4 Transportation

The following section describes potential impacts to the transportation program resulting from the different alternatives and associated resource management opportunities. This section includes a description of potential impacts on the BLM's ability to acquire access across private lands, develop access across public lands, identify acquisition areas, and manage the transportation network. Refer to Map 48 for transportation.

For the purposes of this analysis, providing access to sections of the planning area previously inaccessible is considered a beneficial impact to the transportation program. These beneficial impacts can be direct, such as when the BLM acquires access to an area for recreation purposes, or indirect, such as when a road developed for oil and gas activities opens previously inaccessible areas of the planning area. Routine and emergency maintenance activities on roads and trails are considered inherent requirements of the transportation program, and would not represent an adverse impact on the transportation program. Because access would be acquired only from willing land owners, impacts to private land interests would be minimal. Certain resource management actions have the potential to adversely impact the transportation program by placing limitations on transportation development.

4.6.4.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The transportation network (i.e., highways, railways, airports) within the planning area is essentially complete and no major transportation infrastructure facilities are anticipated. Developing new roads for recreational access will be limited.
- Additional roads will be developed, as needed, to support expanded oil and gas operations in compliance with the multiple use concepts within FLPMA; the transportation program may adopt some of these roads for specific uses, such as recreational access.
- Use of roads will increase based on anticipated increases in oil and gas activity and recreational use demands.
- Unauthorized or unneeded roads may be closed and reclaimed.
- Road design and construction will consider other resource programs to minimize impacts.

4.6.4.2 Analysis of Alternatives

Allowable uses and management actions with the potential to impact transportation include cultural and paleontological resources, fish and wildlife, soils, special status species, riparian and wetland communities, VRM, water resources, recreation, OHV use, and each of the special designations.

Impacts Common to All Alternatives

The types of impacts projected to occur to transportation resulting from the various alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative. Therefore, impacts to transportation are described under individual alternatives.

The alternatives allow varying amounts of new development directly and indirectly to meet the demand for recreational access. The increased level of development associated with oil and gas and other minerals and forest management would modify the road network, which provides additional access through the planning area. This additional access provides opportunities for recreation, particularly OHV use and dispersed recreational activities. The transportation program attempts to capitalize on these developments as opportunities to meet access demand. Access acquisition is primarily focused in Natrona County. Access would be acquired only from willing landowners, so it is anticipated that impacts on private land ownership would be minimal. Access to some acquisition areas may require multiple access routes, as well as multiple types of access (e.g., roads, pedestrian, or equestrian trails). Managing new roads would require routine and emergency maintenance. Other resource considerations (e.g., cultural resources, special status species) may constrain routing alternatives, require that other routing alternatives be adopted, may increase acquisition costs, or may determine that access acquisition would not be feasible.

Alternative A

Under Alternative A, the BLM pursues acquisition of 16 easements for access across approximately 36 miles of private land. In addition, the BLM seeks to obtain access to 12 identified areas for acquisition. Acquiring the easements would provide legal public access to areas with high recreation demand and facilitate use of public lands otherwise inaccessible to and unusable by the public, as well as allow administrative access for management of natural resources. Acquiring easements would be a direct, long-term beneficial impact to the transportation program.

Alternative B

Under Alternative B, the BLM pursues acquisition of the same number of easements as under Alternative A. Access is obtained to five identified areas for acquisition where demand and public use are high. Alternative B results in a considerably lower level of direct, long-term beneficial impacts to the transportation program, as compared to Alternative A, by providing less public and administrative access to lands currently inaccessible and unusable.

Alternative C

Under Alternative C, the BLM pursues acquisition of eight easements for access across approximately 25 miles of private land. Access is obtained to all identified areas for acquisition under Alternative A, with the exception of Table Mountain. Alternative C results in a somewhat lower level of direct, long-term beneficial impacts to the transportation program as compared to Alternative A by providing less public and administrative access to lands currently inaccessible and unusable.

Alternative D

Under Alternative D, the BLM pursues acquisition of easements only where needed to meet critical resource needs. Easements are identified on a case-by-case basis where public access demand is high. Access is obtained to all areas identified for acquisition under Alternative A, with the exception of Table Mountain. However, if these areas do not have critical needs, access might not be pursued. Alternative D would likely result in the lowest level of direct, long-term beneficial impact, since only the most critical of public access needs would be met.

Alternative E (Preferred Alternative)

Under Alternative E, the BLM pursues acquisition of easements only where legal access is needed for resource management. Areas are identified on a case-by-case basis to meet program needs and where public access demand is high. Alternative E results in somewhat higher level of direct, long-term beneficial impacts to the transportation program than Alternative A by providing more public and administrative access to lands currently inaccessible and unusable. These access acquisitions focus on a clear definition of public access needs and would be developed in conjunction with a long-term travel management plan.

4.6.4.3 Conclusion

Impacts associated with transportation management (i.e., routine and emergency road maintenance) generally are commensurate with the number of easements acquired under a particular alternative. Alternative E requires somewhat more maintenance than required under Alternative A, while Alternative C requires somewhat less maintenance than required under Alternative A. Alternative B requires considerably less maintenance than required under Alternative A. Alternative D may require the least amount of maintenance, since only areas with critical access needs would be served.

Overall, Alternative E could provide the most growth to the transportation network and increase access within the planning area to the greatest degree, primarily due to increased mineral and oil and gas development and forest products management. Alternative B could provide the lowest level of transportation and access development in favor of resource conservation. Alternatives A and C could be similar in these respects, and potentially provide a balance between increasing transportation and access for resource development and conservation of resources, although this would occur through a slightly different combination of actions. Alternative E could result in a somewhat higher level of beneficial impacts to transportation and public access, as compared to Alternative A

4.6.5 Off-Highway Vehicles

The following section describes the impacts of each alternative on OHV use and management in terms of short-term and long-term impacts. As appropriate, impacts are described as beneficial or adverse with respect to OHV use and management in the planning area. Refer to Maps 49 to 53 for OHV use designations by alternative in the planning area. See Appendix R for additional information on OHV management.

4.6.5.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- OHV use is motor vehicle use of the nonhighway road and trail network on public lands. It includes all resource-related activities, including recreation and those associated with livestock grazing and mineral development.

- OHV use will increase at a faster pace than the rate of population growth because of the increasing popularity of off-road travel, improvements to OHV technology, and intensity of development and use of public lands.
- Recreational OHV use is highest within large blocks of public land with legal access and with special resource values such as those associated with hunting and fishing.
- If adequate infrastructure exists and is maintained, the majority of recreational OHV users choose routes that minimize environmental degradation.
- The analysis assumes OHV designations are to be fully implemented 5 years after approval of this RMP.

4.6.5.2 Analysis of Alternatives

Allowable uses and management actions with the potential to impact OHV use primarily include land use designations and restrictions. Impacts are described in two ways: the impact a particular designation has on OHV use, and the impact OHV use has on lands due to a particular designation.

Impacts Common to All Alternatives

All alternatives designate areas within the planning area as open, closed, limited to existing roads and trails, or limited to designated roads and trails. All designations except "closed" allow for off-road vehicle travel during the performance of necessary tasks provided no resource damage incurs.

Impacts from the designation "Open to All Motor Vehicles." This designation would be of great benefit to users of ATVs, motorcycles, and other strictly off-road vehicles. The impact is that such designations benefit OHV users and the community by providing an appropriate, managed place for a kind of OHV recreation considered inappropriate in most areas. "Open" designations often allow for unmanaged road proliferation, damage to or loss of vegetation, soil erosion, or degradation of the visual quality of the landscape. Such designations are often in direct conflict with other resource values, such as wildlife habitat and scenic quality.

Impacts from the designation "Limited to Existing Roads and Trails." Under this designation, unauthorized user-created roads and trails would continue to add to the number and miles of motor vehicle routes already in existence on public lands. No existing inventory of roads exists, making it difficult for the BLM to determine what existed at the time of the RMP decision. A new set of vehicle tracks is often confused with an "existing" road and as these tracks attract use, new roads are made. Accordingly, the road system continues to grow. Neither public access nor OHV opportunities would be diminished by this designation.

Impacts from the designation "Limited to Designated Roads and Trails." Under this designation, the incremental growth of unauthorized user-created roads and trails would be curtailed, as would unauthorized OHV use. OHV use would be limited to a specific, designated network of roads and trails. Such a limitation would be beneficial to soils and limit the spread of INPS but would have no impact on commercial or industrial uses of public lands, because roads necessary to facilitate those uses are handled under permits or authorizations. This designation would not affect public access, nor would it diminish OHV opportunities. Further, it would have no impact on other resource uses, such as mineral development, because under such a designation, access roads are authorized as needed.

Impacts from the designation "Closed to All Motor Vehicle Use." This designation eliminates motor vehicle access from the closed areas, limiting access to nonmotorized means (e.g., foot or horseback). However, no alternative proposes more than 2 percent of the public lands administered by the Casper

Field Office to be "Closed," so the impact is minor. This designation would be highly beneficial to the resources and resource uses, (wildlife habitats, etc.) it earmarks for protection. "Closed" designations adversely affect uses requiring road access, such as minerals when there is a need for road access in closed areas to develop the minerals.

Alternative A

Alternative A continues current OHV use designations, including 187 acres (< 1%) open to OHV use within the Poison Spider OHV Park; 1,311,715 acres (96%) designated as limited to existing roads and trails; 47,014 acres (4%) designated as limited to designated roads and trails; and 2,661 acres (< 1%) as closed to OHV use. This alternative would have no impact on the volume of OHV use either in the short or long term. Because of the designation's nature, some degree of unauthorized road proliferation would continue. The "Open" designation of the Poison Spider OHV area would continue to fill a need and is considered to be a positive impact. The "closed" area, less than 1 percent of the planning area, would curtail soil erosion and damage to vegetation for critical resources—a positive impact that would far outweigh any adverse impact due to the exclusion of motor vehicle access.

Alternative B

Alternative B has no impact on the overall pattern of OHV use in the planning area even though the OHV designations would change substantially. Further, there would be no change in access to public lands. The biggest impact is that OHV management would be more effective on 425,657 acres (31% of the planning area) of public lands designated as "limited to designated roads and trails." OHV use in about 33 percent of the planning area would be managed to protect erosive soils, riparian habitats, and important wildlife habitats. Limitations in these areas would help protect sensitive resources.

For the remainder of the planning area, 909,651 acres (67%) would be designated as "limited to existing roads and trails;" 26,027 acres (2%) would be "closed;" and 242 acres (< 1%) would be "open" to all OHV use.

In the area "limited to existing roads and trails," a degree of unauthorized road and trail proliferation would continue.

The expansion of the Poison Spider OHV Park by 55 acres (from 187 to 242 acres) would help alleviate congestion resulting from increasing popularity of the site. The expanded open area would reduce some conflict and safety issues associated with OHV use at the site. This "open" designation is a positive impact, since it provides an appropriate venue for unlimited OHV activities in an environmentally appropriate setting.

The OHV closure (26,027 acres) would help protect irreplaceable paleontologic and historic resources and areas of particular environmental concern.

Mineral use of public lands approved by this RMP remain unaffected by this alternative because roads necessary for development are routinely authorized.

Alternative C

Alternative C would result in 285 acres (< 1%) "open to all OHV use;" 1,162,113 acres (85%) designated as "limited to existing roads and trails;" 191,236 acres (14%) "limited to designated roads and trails;" and 7,943 acres (1%) "closed to all OHV use."

Overall, the impacts under this alternative are similar to Alternative A. The difference is that a greater degree of improved management would be directed toward protecting erosive soils, riparian habitats, and important wildlife habitats. Limitations in these areas would help protect sensitive resources.

The large area proposed for designation as "limited to existing roads and trails" would see some degree of continued unauthorized road and trail proliferation.

The benefits of expanding the Poison Spider OHV Park described under Alternative B apply to this alternative as well, but to a larger degree given the larger expansion area.

The proposed "closed" area would provide significant protection for critical resources, but be insignificant in terms of a loss of OHV opportunities.

Mineral use of public lands approved by this RMP would remain unaffected by this alternative because roads necessary for such development are routinely authorized.

Alternative D

Alternative D has no significant impact on the overall pattern of OHV use within the planning area. The acreage of lands include 285 acres open to all OHV use; 1,292,630 acres (95%) designated as "limited to existing roads and trails;" and 66,001 acres (5%) designated as "limited to designated roads and trails." These two "limited" categories are nearly identical to Alternative A. Under this alternative, 2,661 acres would be "closed to all OHV use," an area almost equal to the acreage also proposed for closure in alternatives B and C.

The impacts regarding the Poison Spider OHV Park are identical to Alternative C. The benefits of expanding the Poison Spider OHV Park would continue as described for Alternative C and be long-term in nature. A potential second OHV park would benefit urban OHV users by providing a needed venue for activities unsuitable elsewhere on public lands.

The proposed "closed" area provides substantial protection for critical resources, but would otherwise be insignificant in terms of a loss of OHV opportunities or motorized access to public lands. The OHV closure (2,661 acres) would help protect irreplaceable paleontological and historic resources and areas of particular environmental concern.

Mineral use of the public lands approved by this RMP would remain unaffected by this alternative because roads necessary for such development are routinely authorized.

Alternative E (Preferred Alternative)

Alternative E changes OHV designations within specified areas, resulting in 285 acres "open to all OHV use;" 196,824 acres (15%) designated as "limited to designated roads and trails;" 1,162,244 acres (85%) designated as "limited to existing roads and trails;" and approximately 2,224 acres "closed to all OHV use." Alternative E expands the existing Poison Spider OHV Park as done in alternatives C and D.

This alternative is similar to the others in that the majority (85%) of the public lands in the planning area are proposed for the "existing roads and trails" category. When implemented, this alternative would help curtail unauthorized road proliferation on the majority of the planning area. Alternative E provides a balanced approach to OHV management anticipated to have a minimal impact to OHV users and other resource values.

This alternative does not limit public access or change the authorized use of the public lands; however, it has fewer adverse impacts than the present situation across the spectrum of resource values and uses of public lands, including livestock grazing and wildlife habitats. Recreational activities and settings would be protected from degradation due to road and trail proliferation.

The proposed "closed" area, less than 1 percent of the planning area, would provide substantial protection for critical resources, but be insignificant in terms of a loss of OHV opportunities. The OHV closure would help protect irreplaceable paleontological and historic resource and areas of particular environmental concern.

Mineral use of public lands approved by this RMP would be unaffected by this alternative because roads necessary for such development are routinely authorized.

4.6.5.3 Conclusion

Alternatives B, C, and E substantively change OHV-use designations compared to Alternative A. These three alternatives provide more effective management of motorized use to sensitive areas and decrease environmental impacts from motor vehicle use.

Alternatives A and D have the greatest potential for user conflicts and degradation of natural resources. These alternatives do not provide the BLM with management tools needed to reduce unauthorized activities, such as off-trail OHV use and OHV use in sensitive areas and (or) habitats. The impacts of all alternatives are incurred in the short term and last through the life of the RMP.

4.6.6 Livestock Grazing

Allowable uses and management actions limiting, reducing, or prohibiting livestock grazing or animal unit months (AUMs) in the planning area are considered adverse impacts. Deterioration in rangeland health also is considered adverse to livestock grazing. For example, restrictions on livestock grazing or AUMs from other resources are considered adverse impacts. Conversely, beneficial impacts to livestock grazing include those allowable uses or actions that improve rangeland health, increase AUMs, or decrease restrictions and costs to graze livestock.

Direct impacts to livestock grazing from RMP alternatives are anticipated from actions that change AUM allocations, alter rangeland health, or restrict livestock grazing. For example, the BLM policy requirement for deferring two growing seasons of grazing following prescribed burns and wildland fire would be considered a direct adverse impact to livestock grazing because it would prohibit grazing. Indirect impacts to livestock grazing are anticipated from actions that change rangeland health and productivity or that change livestock grazing management on BLM-administered public lands within the planning area. For example, the deferment of grazing following fire may require the lessee to lease additional pasture, feed livestock for longer periods of time, install additional fencing, or reduce herd size. On the other hand, deferment enhances vegetative recovery, which over time could benefit livestock grazing through improved forage conditions. In addition, surface-disturbing activities could decrease forage availability indirectly by decreasing range productivity due to the introduction of INPS.

For the purpose of this analysis, short-term impacts to livestock grazing include activities that change the AUM allocation or range health within 5 years of when the activity occurs. Long-term impacts are those remaining or occurring after 5 years. For example, the 2-year grazing deferment following fire would be a short-term impact; a long-term beneficial impact to livestock grazing also may occur if the result is an increase in the quality or quantify of forage.

4.6.6.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- No net change in AUMs is expected in the planning area from implementing land-disposal and land-acquisition actions.
- All surface use proposals are to be fully implemented during the planning period.
- Surface disturbances reduce the amount of forage available to livestock and wildlife and can be short and long term (see Appendix M).
- Surface disturbances increase the likelihood for the introduction and spread of INPS, which degrade rangeland health.
- To varying degrees, areas of concentrated livestock use exists in most allotments (i.e., riparian and wetland areas, salting areas, fence corridors, etc.).
- Grazing practices can maintain, improve, or degrade rangeland health. Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming (BLM 1998b) are designed to maintain or improve rangeland health. Approximately 10 percent of the public land acreage in the planning area is evaluated annually.
- Managing wildlife and special status plants and wildlife can affect livestock grazing allocations.
- Management actions for other resource uses can affect livestock grazing allocations and management.
- The BLM works with grazing lessees to identify and accomplish livestock grazing objectives. Over the last 50 years, rangeland health has improved across the planning area due to improved grazing management practices.

4.6.6.2 Analysis of Alternatives

Allowable uses and management actions potentially impacting livestock grazing include all surface-disturbing activities, restrictions protecting other resources, fire management, INPS, and proactive livestock grazing management practices. These allowable uses and management actions are anticipated to result in changes in AUM allocations and rangeland health. Although multiple factors influence AUM allocations and rangeland health, key planning issues identified during the scoping process identified surface-disturbing activities, restrictions protecting other resources, fire management, and INPS as the primary factors to be discussed in this section. Surface-disturbing activities and associated acreage are identified in Appendix M as part of the BLM's RFAs. Restrictions protecting other resources relate to inherit conflicts between completing resources and uses of the public lands and the challenges of managing for multiple use. The affect fire and, in some instances, lack of a natural fire regime, has on vegetative communities is another planning issue identified during the scoping process impacting livestock grazing. This impact could be through the short-term loss of forage and damage to range improvement facilities or the long-term changes occurring in forage quantity and quality or in plant community structure and composition. INPS also are a growing public concern in the planning area.

Improper grazing practices can adversely impact other resources, which, in turn, can affect management decisions related to livestock grazing. For example, season-long grazing in riparian areas can reduce riparian vegetation, breakdown streambanks, increase surface runoff and soil erosion, degrade wildlife habitat, and encourage the invasion or spread of INPS. Measures to mitigate these impacts could lead to changes in season of use, additional fencing, or reduction in AUMs. The impacts of livestock grazing on

other resource topics (e.g., physical, biological, etc.) are discussed under the appropriate impacted resources.

Impacts to livestock grazing are described and organized according to (1) changes in AUM allocations, (2) changes in rangeland health, and (3) management actions. The description of management actions includes actions restricting livestock grazing, as well as actions that benefit livestock grazing. Refer to Maps 54 through 56 for livestock grazing.

Impacts Common to All Alternatives

The types of impacts projected to occur to livestock grazing as a result of alternatives are similar and include changes in AUM allocations and changes in rangeland health. The factors anticipated as causing these impacts to livestock grazing primarily include surface-disturbing activities, restrictions protecting other resources, fire management and ecology, INPS, and proactive management actions of individual alternatives. Changes in AUM allocations and rangeland health, and the associated causative factors of these changes, are described below as impacts common to all alternatives. How the intensity of these impacts vary by alternative is described under individual alternatives.

Livestock grazing continues to occur within the majority of the planning area under all alternatives. Only 6,016 acres would be closed to grazing. *The Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998b) would be applied, regardless of alternative. Vegetation treatment projects designed to benefit rangeland health also are anticipated to occur under all alternatives. Over the life of the plan, it is estimated that to achieve or maintain the DFC for rangelands, approximately 500 acres of mechanical treatment, 8,000 acres of chemical treatment, and 20,000 acres of prescribed burning need to occur (Fifield 2004). Mechanical treatment of rangeland includes the mowing of sagebrush and the mowing or shredding of limber pine and juniper. This type of treatment is done to increase forage production and improve forage quality, as well as to facilitate grazing management activities (e.g., moving livestock between pastures). Chemical treatments are implemented to thin stands of sagebrush for improved forage production and to facilitate grazing management objectives, as well as to supplement INPS control activities in specific areas of the planning area. Prescribed burning is anticipated to be a higher priority over the life of the plan than it has been in the past. Prescribed burns are used to attain DFC, such as maintaining rangeland in a specific seral condition and to achieve wildlife, livestock, and watershed management objectives.

The analysis of alternatives is based on existing conditions and considers that over the last 40 to 50 years, an improvement in range conditions has occurred (see Livestock Grazing in Chapter 3). Such improvement is due largely to improved grazing management practices, development of range improvement projects (e.g., fences and water developments), and, in some cases, reduction in livestock numbers or change in kind of livestock. To various degrees, improvements in range conditions generally are anticipated to continue under all alternatives based on vegetation treatment, range-improvement projects, and development of guidelines for areas determined as not meeting rangeland health standards. Approximately 10 percent of the public land acreage in the planning area is assessed annually for rangeland health. INPS is one factor that may adversely impact the improving trend. Rangeland improvement projects, such as fencing and water development, also occur under all alternatives. It is anticipated that throughout the planning area, the development and maintenance of springs impact approximately 32 acres, new reservoir construction 80 acres, well installation 13 acres, water pipeline installation 36 acres, reservoir maintenance 40 acres, and fencing approximately 432 acres (Appendix M). Impacts associated with fencing and water pipelines generally are considered to be short-term and typically regeneration occurs within two to three growing seasons. While impacts associated with the construction of these facilities are short-term, the indirect impacts of these actions can be long-term. For

example, new fences and new water developments are expected to change livestock grazing patterns and distribution within the allotment. Moreover, congregation of livestock and wildlife around the water source and trailing patterns also are expected to change as a result of constructing these facilities. Overall, the long-term impacts from these facilitates are anticipated to be a beneficial improvement of rangeland health. Rangeland improvement projects allow livestock managers and permittees to better implement grazing management practices and manage the distribution and movement of livestock within allotments.

Changes in AUM Allocation

Changes in AUM allocations within the planning area may occur for several reasons, but generally would be limited to specific allotments. In many cases, a change in AUM allocations reflects a change in management of livestock within an allotment, or a change in management of another resource that affects livestock. For example, if grazing management and (or) range improvement projects have increased the overall productivity of an allotment, then it may be appropriate to increase the number of AUMs permitted under the grazing lease for that allotment. Conversely, if forage productivity changes due to surface disturbances, fire, wildlife use (e.g., elk, prairie dogs), INPS increases, and (or) if monitoring indicates a downward trend in rangeland health, the number of AUMs permitted in an allotment may decrease. The number of AUMs permitted in an allotment also may decrease if it is discovered that the number of AUMs originally permitted over-allocated the forage resource. This may occur in allotments where features such as rock outcrops, steep slopes, rock or bare ground, or other factors limiting forage utilization by livestock were not adequately accounted for when AUMs were originally allocated. Any potential changes to AUM allocations would be based on the amount of available forage in an allotment as determined through monitoring or other means. The number of AUMs permitted in an allotment may be adjusted permanently, placed into suspended use for the short-term (i.e., 3 to 5 years), or placed into temporary (1 year) non-use status. Temporary non-use status is re-evaluated on an annual basis. Changes in AUM allocations have more impact on individual allotments and lessees than they do to AUM allocations in the entire planning area.

Management actions potentially affecting the allocation of AUMs within the planning area include land disposal, mineral development, revocation of SDW withdrawals, managing big game crucial winter range, dedicating lands for recreation use (e.g., campgrounds), as well as management actions related to drought and wildland fire. Any changes in AUM allocations affect revenues generated by grazing fees, 50 percent of which are used by the Casper Field Office for range-improvement projects. The remaining 50 percent of grazing fee revenues on public lands in the planning area are used for public schools in the State of Wyoming. A more complete comparison of revenues generated by grazing fees among alternatives is described in the Socioeconomics section in this chapter.

Land disposal could occur throughout the planning area, but is focused primarily in Converse, Goshen, and Platte counties. The majority of land disposed would likely continue to be grazed under different (e.g., private) ownership; however, grazing fees would no longer be collected by the BLM for these areas. Frequently, land disposal is tied to land exchanges, resulting in no net change in AUMs, or only a slight increase or decrease in AUMs. Land exchanges between the BLM and private entities typically result in the BLM acquiring fewer acres of higher overall quality than the acreage disposed, resulting in a reduction in the number of acres managed by the BLM. However, the impact on overall AUMs in the planning area cannot be predicted due to the differences in forage production among sites. In addition, the Casper Field Office targets lands for acquisition that help to consolidate public lands into larger blocks, making management more efficient. Therefore, land disposal and acquisition may or may not occur in the same allotment. Consequently, land exchange frequently has a more dramatic impact on specific allotments than on the total number of AUMs in the planning area.

Mineral development on public lands can result in the direct removal of forage available to livestock. As shown in Appendix M, projected surface disturbance from mineral development is anticipated to include short- and long-term removal of forage. Rangeland health and forage production can be indirectly affected by mineral development through the introduction and spread of INPS and soil loss. Both the direct and indirect impacts of mineral development are associated with surface disturbance caused by constructing road networks; drilling; installing well pads, pumps, pipelines, and water-detention facilities; other associated infrastructure; and ongoing maintenance. When compared to other minerals, oil and gas development is anticipated to cause the most surface disturbance and, hence, the most adverse impact on livestock grazing in the planning area. Forty allotments administered by the Casper Field Office are in areas considered having a high to moderate potential for oil and gas development. All or portions of these 40 allotments would likely be affected by oil and gas development. Both short-term and long-term impacts to AUM allocations may occur, of which the long-term impacts are of greater concern to livestock grazing. The degree of impact would depend on the rate of development, production success, and how quickly disturbed areas are reclaimed. For example, it is expected that disturbed areas associated with nonproducing wells would be reclaimed fairly quickly and AUMs taken out of production restored. This would be considered a short-term impact. On the other hand, for producing wells, it may take many years before disturbed areas are reclaimed and made available for grazing use. This would be a long-term impact. Reducing AUMs would be local in nature since development is unlikely to occur simultaneously across the entire area (e.g., all wells developed at the same time). The impact on AUM allocations could be substantial for individual allotments, but the overall impact of disturbance from oil and gas development on AUMs in the planning area is expected to be negligible.

In some instances, oil and gas development can benefit livestock by increasing the number of water wells available for livestock watering, thereby improving livestock distribution in an allotment. In other words, wells developed through oil and gas development can, in some instances, be converted to water wells for use by livestock and wildlife.

The revocation of SDW withdrawals would not substantively affect the total number of AUMS within the planning area, but would change how they are allocated among allotments. See Appendix T for SDW management standards.

Subdividing base property for recreation or housing developments is a recent activity that could potentially impact the BLM's ability to effectively manage adjacent public lands for grazing. Subdividing would primarily impact individual grazing allotments and could result in breaking allotments into smaller units or in canceling the grazing lease entirely. In addition to structures, subdivisions generally result in more roads, fences, powerlines, and other facilities—all of which can fragment habitat and increase the opportunity for introduction or spread of INPS. The long-term impact could result in loss of AUMs and degradation of rangeland health.

Long-term disturbances due to development on lands not administered by BLM are expected to be substantially greater than projected long-term disturbances on BLM-administered lands for all alternatives (Appendix M).

Under alternatives A, C, D, and E, the projected long-term oil and gas development assumes a decrease in the number of AUMs (an average of approximately 2,270 AUMs) on BLM surface lands. These actions would have the most substantial impact on the 40 allotments that possess a moderate to high potential for oil and gas development. However, when the entire planning area is considered, a decrease of 2,270 AUMs represents only 1 percent of the AUMs administered by the Casper Field Office.

Changes in Rangeland Health

Several natural and manmade factors can adversely affect rangeland health and productivity within the planning area. Natural factors include climatic cycles, such as drought, overpopulation of wild ungulates, and catastrophic events (e.g., flash floods or wildland fire). Manmade factors within the planning area generally include improper grazing, prescribed fire, surface disturbances, and INPS.

Improper grazing by livestock within an allotment can increase soil compaction and hummocking in riparian and wetland areas and around water sources, decrease cover and vigor of native vegetation, increase the spread of INPS, increase trailing, increase soil erosion, accelerate streambank erosion, increase stream channel down-cutting, and generally degrade riparian and wetland areas. Two main reasons why many allotments did not meet rangeland health standards are the condition of riparian and wetland areas and the presence of INPS, but with proper livestock grazing management, rangeland health can improve. Breaking up soil crust that restricts infiltration and inhibits seedling establishment and increasing cover and vigor of native vegetation are two ways of improving livestock grazing management. Increased cover and vigor of native vegetation could minimize soil erosion. The health of riparian and wetland areas also can be affected by grazing management and implementing rangeland improvement projects. Of note is that wildlife can cause similar types of adverse impacts to an allotment as those described for livestock. For example, in crucial big game winter range, heavy browse use by pronghorn has had a detrimental impact on rangeland health in these communities. Other examples of wildlife impacts include over-browsing important shrub species and increasing the spread of INPS; however, within the planning area, the intensity of these types of adverse wildlife-caused impacts to rangeland health typically is less than those caused by livestock. All alternatives strive to prevent improper grazing through implementation of *The Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998b). Therefore, it is anticipated that the degree and extent of grazing-related impacts on public lands over the long term should continue the current trend of improvement.

Fire can have both beneficial and adverse impacts on livestock grazing. In the short term, fire burns forage that livestock depend on and can damage facilities such as fences. This damage can have a substantial adverse economic impact on grazing operations by requiring leasing of additional pasture, feeding livestock for longer periods of time, building more or repairing fences, and reducing herd size. BLM policy requires deferment of livestock grazing, following prescribed burns or wildland fire, for a minimum of two growing seasons; however, deferment depends on the severity of the fire and the types of restrictions placed on grazing use on public land. In the long term, fire may improve the quality and quantity of forage, thereby improving flexibility in managing livestock.

Both prescribed and wildland fires can increase the extent of INPS found on an allotment. The extent that fire degrades rangeland health through propagation of INPS typically depends on the proximity to a source of INPS seed, the type of vegetation community burned, and fire severity. For example, within the planning area, fires in mountain big sagebrush communities appear to be more resistant to cheatgrass infestation following a fire than other vegetation communities (e.g., mountain mahogany). Fire management using prescribed fire can benefit livestock grazing by improving the quality, quantity, and availability of forage for livestock. Prescribed fire also can help meet specific management objectives, such as improving distribution of livestock or removing dense stands of brush. However, prescribed burns generally are less likely in areas with mineral and energy development. Fire-suppression activities can limit the loss of livestock, short-term loss of forage, and in some cases, the long-term damage to vegetation caused by fire, but it can also increase the likelihood of INPS introduction and (or) spread into an allotment. The long-term impact of repeated fire suppression is the buildup of hazardous fuels and the increased risk of severe or catastrophic wildland fire.

One of the primary indirect impacts of surface disturbance affecting rangeland health and productivity is the introduction and spread of INPS. INPS displace native vegetation and, because they typically are unpalatable to livestock and wildlife, remain ungrazed. This places more strain on remaining native vegetation to support grazers, giving INPS an additional advantage over native vegetation in their competition for water, nutrients, and light. Invasion of some weed species (e.g., cheatgrass) can alter the fire regime of an area, causing long-term adverse impacts to livestock grazing. Surface-disturbing activities (see Glossary in Volume 2) typically include mechanized or mechanical disturbance, such as construction of well pads, roads, pits, reservoirs, pipelines, and powerlines; mining; and vegetation treatments. Although typically reclaimed, these activities can increase INPS infestations and soil erosion within allotments in both the short and long term. Land reclaimed from oil and gas or other activities generally has a short-term beneficial impact on rangeland productivity due to the reseeding and subsequent growth of native grasses.

Although not classified as a surface-disturbing activity, livestock grazing on public lands can decrease forage and disturb soils, thereby providing opportunities for INPS. Moreover, livestock, wildlife, and OHV use can transport INPS seeds to new locations, thereby expanding INPS to new locations. For example, without a holding period to allow flushing, movement of livestock onto or within public lands can spread INPS to new locations. Dust is another type of indirect impact caused primarily by roads. Dust can affect rangeland health and productivity and decrease the palatability of forage for livestock and wildlife.

In areas accessible to livestock, vegetation treatments, such as forest clear-cutting and thinning, also can indirectly benefit livestock grazing by allowing more light to reach understory vegetation, thereby increasing herbaceous growth and temporarily increasing the amount of available forage to livestock. However, the authorized use of the area would be unlikely to change. Forest clear-cutting and thinning also could increase soil erosion and the spread of INPS.

Management Actions

Stipulations or restrictions designed to protect or manage other resources may adversely impact livestock grazing. Conversely, management actions designed for livestock grazing (see Chapter 2 alternatives) may benefit livestock grazing. Management actions of both types are described in this section. Impacts resulting from these actions that are anticipated to vary by alternative are described under individual alternatives.

Managing cultural resources can restrict the location and design of rangeland improvement projects and consequently grazing systems. For example, avoidance of significant cultural resource sites, limitations on activities located within ¼ mile of historic trails, and activities impacting the historic landscape, may limit the BLM's ability to construct rangeland improvement projects in an allotment aimed at better management of livestock. In addition, cultural resource management can delay construction of range-improvement projects by requiring additional surveys and designing changes in projects to avoid important cultural sites.

Management for plant and wildlife species designated as threatened or endangered under the Endangered Species Act (ESA) or are considered to be sensitive species by the BLM in the planning area can affect livestock grazing in allotments where these special status species occur. Specifically, restrictions on the type, location, or time period the activity is allowed could limit livestock management options in allotments where sensitive species occur. For example, NSO restrictions could affect development or placement of range improvement projects and potentially affect the ability of the BLM or a grazing operator's ability to implement grazing management practices. In addition, special status species management can increase costs to livestock grazing operations by requiring additional surveys and design changes to projects. Water developments for livestock located in the Platte River watershed (part of the

planning area) need to consider potential adverse consequences on threatened and endangered species found in the Platte River in Nebraska. In sagebrush habitats, where greater sage-grouse or other sagebrush-dependent species may occur, the placement of range improvement projects, season of grazing use, level of grazing use, use of prescribed fire, adjustments in grazing preference, and seasonal restrictions all may be affected. Prairie dogs are another species that may affect livestock grazing. Though neither the white-tailed prairie dog nor the black-tailed prairie dog are listed as threatened or endangered, the black-tailed prairie dog is a BLM-sensitive species, and both species are important food sources to several raptors and provide habitat for the burrowing owl and the black-footed ferret. The agricultural community in the planning area is concerned about large towns of prairie dogs and the affect they have on the forage base, as well as how managing these species affects their grazing operations.

Nine special status plant species are known to or may occur in the planning area (see Special Status Species – Plants). Special considerations for the management of these plant species as they are discovered or as critical habitat is designated, could also impact livestock grazing. To prevent trampling by livestock, water developments and placement of salt, mineral, or forage supplements for livestock would not be allowed in areas inhabited by special status species or other sensitive areas under all alternatives; however, the size of the buffers vary by alternative. Any sort of buffer may restrict the placing and (or) timing of constructing range-improvement projects. In addition, no surface disturbance and no wildlife-disturbing activities would occur under any alternative within ¼ mile of all potential mountain plover nesting areas between April 10 and July 10. Each alternative poses different variations on buffer sizes and timing for raptors, greater sage-grouse, and special status plants (see Special Status Species sections).

Resource management actions pertaining to fish and wildlife management, special status species management, mineral development, lands and realty management, OHV use, recreation use, SMA management, INPS management, fire management, soil management, forest and woodland management, grassland and shrubland management, and riparian and wetland management could potentially affect livestock grazing. Those actions that are anticipated to substantively impact livestock grazing are identified by alternative under the headings “Changes in AUM Allocations” and “Changes in Rangeland Health,” below.

Alternative A

Changes in AUM Allocations

Most of the planning area continues to be open to livestock grazing under Alternative A (6,016 acres are closed to grazing). Currently, approximately 182,479 AUMs are in the planning area. Over the life of the plan, AUMs are anticipated to decrease approximately 1 percent (to 179,977) under Alternative A. The anticipated decline in AUMs is due primarily to the 21,087 acres of projected long-term surface disturbance (Table 4-1). Prescribed fire, wildland fire, silvicultural practices, and other vegetative treatments impact livestock grazing in the short-term. Livestock grazing would be removed for one or more growing seasons to allow for regeneration of vegetation. In the long-term, these activities have beneficial impacts by improving the quantity and quality of forage available to livestock.

Changes in Rangeland Health

Current management seeks to maintain and improve rangeland health on all grazing leases with emphasis on I and M category allotments (refer to Glossary). Ten percent of public land acreage in the planning area is evaluated annually to determine whether they meet standards for healthy rangelands, including an assessment of soil erosion condition and stability. Indirect adverse impacts in rangeland health under Alternative A are anticipated from the invasion and spread of INPS, which is a function of surface disturbance.

Alternative B

Changes in AUM Allocations

Most of the planning area continues to be open to livestock grazing under Alternative B. Over the life of the plan, AUMs are anticipated to decrease less than 1 percent to 181,247 under Alternative B. The anticipated decline in AUMs is due primarily to the 11,565 acres of projected long-term surface disturbance (Table 4-1). As in Alternative A, prescribed fire, wildland fire, silvicultural practices, and other vegetative treatments impact livestock grazing in the short term. Livestock grazing would be removed for one or more growing seasons to allow for revegetation. In the long-term, these activities would have beneficial impacts by improving the quantity and quality of forage.

Alternative B requires that livestock grazing be managed to maintain a protective cover of vegetation and litter on all BLM-administered surface in the planning area. All grazing allotments would be monitored every year. Forage utilization would be limited to 40 percent of the current year's production. Implementing this alternative could result in the reduction of AUMs in many allotments throughout the planning area and affect management of a large number of grazing operations. Changes in herding practices and season of use, placement of supplement, additional fencing, and water developments may be needed to meet the target utilization levels. Some grazing operations may have to find additional forage or possibly reduce numbers. The reduction in AUMs is difficult to project, but could be greater than those lost due to surface disturbance. In some allotments, forage quantity and quality could improve with these changes and in the long-term, there could be an increase in AUMs. Wildlife accounts for some of the use and while livestock would be removed when 40 percent utilization is reached, wildlife use would continue.

Changes in Rangeland Health

Alternative B seeks to maintain and improve rangeland health on all grazing leases with an emphasis on all grazing allotments. Alternative B monitors all grazing allotments annually to limit forage utilization to 40 percent of the current year's production. Indirect adverse impacts in rangeland health under Alternative B are anticipated from the invasion and spread of INPS, a function of surface disturbance. Impacts from INPS are anticipated to be the least of any alternative under Alternative B (see INPS section). Under Alternative B, the placement of salt, mineral, or forage supplements for livestock would not be allowed within ½ mile of water, wetlands, and riparian areas, unless NEPA analysis shows that watershed, riparian, wetland, wildlife, and vegetative values would not be adversely affected. This management practice would lessen the amount of time livestock spend in these areas and improve the overall distribution of livestock. This would benefit the overall health of riparian and wetland communities and also the upland communities. Various factors including slope, vegetative communities, drainage patterns, location of water sources, and kind of livestock would influence the location and effectiveness of supplement placement. In some grazing allotments, it may be difficult to find suitable locations to meet this distance requirement.

Alternative C

Changes in AUM Allocations

Most of the planning area continues to be open to livestock grazing under Alternative C. Over the life of the plan, AUMs are anticipated to decrease approximately 1 percent to 180,075 under Alternative C. The anticipated decline in AUMs is due primarily to the 20,358 acres of projected long-term surface disturbance (Table 4-1). All opportunities to utilize wildland fire in commercial forest stands to reduce fuel loads would be taken. This would result in improved forest and woodland health in this fire-dependent ecosystem. However, this would have a short-term impact on livestock grazing by removing units of land for two growing seasons to allow for regeneration (BLM 2004d). Alternative C establishes

target forage utilization levels for allotments with substantive erosive soils. Implementing this alternative could result in the reduction in AUMs in some allotments and affect management of these areas. Changes in herding practices and season of use, placement of supplement, additional fencing and water developments may be needed to meet the target utilization levels. Some grazing operations may have to find additional forage or possibly reduce numbers. In some areas forage quantity and quality could improve with these changes and in the long-term there could be an increase in AUMs. Wildlife would account for some of the use and, while livestock would be removed when 40 percent utilization is reached, wildlife use would continue.

Changes in Rangeland Health

Similar to current management, Alternative C seeks to maintain and improve rangeland health on all grazing leases with emphasis on all I and M category allotments. Alternative C establishes target forage utilization levels for allotments with substantive erosive soils. Indirect adverse impacts in rangeland health under Alternative C are anticipated from the invasion and spread of INPS, a function of surface disturbance. Impacts from INPS under Alternative C are anticipated to be less than under Alternative A (see INPS section). Under Alternative C, the placement of salt, mineral, or forage supplements for livestock would not be allowed within ¼ mile of water, wetlands, and riparian areas, unless NEPA analysis shows that watershed, riparian, wetland, wildlife, and vegetative values would not be adversely affected. Like Alternative B, this management practice lessens the amount of time livestock spend in these areas and improve livestock distribution. This would benefit the overall health of all vegetative communities; however, due to the difference in distance, probably not as much as Alternative B.

Alternative D

Changes in AUM Allocations

Under Alternative D, most of the planning area continues to be open to livestock grazing. Over the life of the plan, AUMs are anticipated to decrease approximately 1 percent to 179,845. The anticipated decline in AUMs is due primarily to the 22,080 acres of projected long-term surface disturbance (Table 4-1). Under Alternative D, silviculture treatments in forests and woodlands, such as burning for regeneration purposes, impact livestock grazing in the short term similar to current management.

Changes in Rangeland Health

Alternative D seeks to maintain and improve rangeland health on all grazing leases with an emphasis on all I category allotments. Alternative D continues current management with respect to monitoring rangeland health. Indirect adverse impacts in rangeland health under Alternative D are anticipated from the invasion and spread of INPS, which is primarily a function surface disturbance. Impacts from INPS under Alternative D are anticipated to be the most of any alternative (see INPS section). Like Alternative C, Alternative D would not allow the placement of salt, mineral, or forage supplements for livestock within ¼ mile of water, wetlands, and riparian areas unless NEPA analysis shows that watershed, riparian, wetland, wildlife and vegetative values would not be adversely affected.

Alternative E (Preferred Alternative)

Changes in AUM Allocations

Most of the planning area continues to be open to livestock grazing under Alternative E. Over the life of the plan, AUMs are anticipated to decrease approximately 1 percent to 179,899. The anticipated decline in AUMs is due primarily to the 21,672 acres of projected long-term surface disturbance (Table 4-1). Livestock grazing and big game browsers and grazers may be restricted in the short term for stands that have burned and are regenerating. Alternative E establishes target forage utilization levels for allotments with substantive erosive soils, similar to Alternative C; therefore, the same impacts would be expected.

Changes in Rangeland Health

Similar to Alternative B, Alternative E seeks to maintain and improve rangeland health on all grazing leases with an emphasis on all grazing allotments. Similar to Alternative C, Alternative E establishes target forage utilization levels for allotments with substantive erosive soils. Indirect adverse impacts in rangeland health under Alternative E are anticipated from INPS, a function of surface disturbance. Impacts from INPS under Alternative E are anticipated to be less than under Alternative A and similar to Alternative C (see INPS section). Like alternatives C and D, Alternative E would not allow the placement of salt, mineral, or forage supplements for livestock within ¼ mile of water, wetlands, and riparian areas unless NEPA analysis shows that watershed, riparian, wetland, wildlife, and vegetative values would not be adversely affected.

4.6.6.3 Conclusion

Based on projected surface disturbance, INPS, and fire management and ecology, Alternative B is anticipated to have the least adverse impact to rangeland health relative to all alternatives. However, Alternative B places the most restrictions on livestock grazing and, therefore, is anticipated to have the most adverse impact to livestock grazing. Conversely, Alternative D is projected to have the most adverse impact to rangeland health and the least restrictions on livestock grazing. Therefore, Alternative D is anticipated to have the least potential adverse impact to livestock grazing in the short term. Alternatives A, C, and E fall between the extremes of alternatives B and D relative to anticipated adverse impacts to rangeland health and restrictions to livestock grazing. INPS is expected to adversely impact rangeland health under all alternatives. Alternative B is expected to have the least potential to spread INPS, whereas alternatives D and A are expected to have the greatest potential. Differences in projected AUMs among alternatives are approximately 1 percent and, therefore, not considered substantially different among alternatives.

4.6.7 Recreation

This section describes the impact of each alternative on recreational uses of public lands in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts are described as beneficial or adverse.

Direct impacts to recreation affect recreational use of public lands and facilities. For example, certain resource development actions might displace recreational uses from a given area, thus directly impacting recreation. An example of an indirect impact is where competing uses of the land adversely affect wildlife habitat, resulting in a decrease in big game populations and, therefore, a decrease in hunting (recreational) opportunities. Beneficial impacts to recreational resources include actions that improve the recreational setting, contribute to better recreational experience opportunities, and ultimately contribute to increased benefits from recreational use of the public lands. Adverse impacts are those that adversely affect the recreational setting, detract from the recreational experience opportunities of users, or decrease benefits from recreational uses.

4.6.7.1 Methods and Assumptions

This section describes environmental consequences as specifically as possible, but because RMP decisions are mostly broad resource allocations, a high degree of specificity often is not possible. Site-specific analysis normally is conducted as RMP decisions are implemented on the ground. For the purpose of this analysis, short-term impacts occur within 5 years of a given management action. Long-term impacts continue past 5 years or take more than 5 years to materialize.

4.6.7.2 Analysis of Alternatives

NHTs and Other Historic Trails and National Back Country Byways are discussed under Special Designations. Impacts to OHV use and visual resources are discussed in their respective sections.

Impacts Common to All Alternatives

Under all alternatives, activities related to resource development (e.g., construction of facilities, land clearing, and drilling activities related to minerals exploration and development; ROWs; and transportation) result in adverse impacts or the displacement of recreational opportunities and the degradation of recreational experiences for the life of those projects. Conversely, some development activities present opportunities to improve legal access to public lands, as well as to improve roads. In addition, management actions limiting development activities, such as developing stipulations (e.g., no surface development restrictions, CSU restrictions, and "no-leasing" restrictions) and mineral withdrawals could benefit recreation by protecting recreational facilities and providing long-term assurance that areas traditionally used for recreational purposes would not be affected by future development activities.

Management actions may inconvenience some users while enhancing the recreational experience of others; however, these actions are not expected to cause large-scale impacts on any level in the planning area.

Table 4-14 shows the SRMAs proposed under the alternatives. By establishing SRMAs, the respective areas become a higher priority for recreation management (See Appendix O for recreation management matrices). Accordingly, the BLM would be able to respond to the need for more intensive management efforts. SRMAs are eligible for construction funding, while Extensive Recreation Management Areas (ERMAs) normally are not. Without establishing SRMAs, recreational management would be a lower priority, management actions custodial in nature, and recurring needs not addressed.

Table 4-14. Recreation Management Areas by Alternative

Area	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Muddy Mountain EEA	SRMA	SRMA	SRMA	SRMA	SRMA
Goldeneye Wildlife and Recreation Area	SRMA	-	SRMA	SRMA	SRMA
North Platte River	SRMA	-	-	SRMA	SRMA
Poison Spider OHV Park	-	SRMA	SRMA	SRMA	SRMA
Middle Fork SRMA in Cooperation with BLM's Buffalo and Worland Field Offices	SRMA	SRMA	SRMA	SRMA	SRMA
National Historic Trails and Other Historic Trails	-	-	SRMA	SRMA	SRMA
Semino/Alcova National Back Country Byway	-	-	-	SRMA	-
South Bighorns/Red Wall National Back Country Byway	-	-	-	SRMA	-
Remainder of Casper Field Office Planning Area	ERMA	ERMA	ERMA	ERMA	ERMA

- No SRMAs
ERMA Extensive Recreation Management Area
SRMA Special Recreation Management Area
EEA Environmental Education Area
OHV off-highway vehicle

Impacts to Recreation Visitation

Recreational visitation is affected by population growth and the relative attractiveness of recreational opportunities. Alternatives promoting industrial development encourage population growth in both the short and long-term, resulting in an increase in the demand for recreational use of public lands. Alternatives enhancing recreational resources increase their relative attractiveness, thereby increasing recreational demand. Recreational visitation would increase accordingly.

Fish and wildlife dependent recreational opportunities would increase or decrease in proportion to the overall productivity of habitats. Habitat management resulting in fish and wildlife population increases would increase recreational visitation. Habitat loss in response to allocation of lands and resources to competing industrial development could cause population decreases that, in turn, would decrease recreational visitation. This would be a long-term adverse impact.

As a state with a substantial tourism market, nonresident recreationists benefit from Wyoming opportunities, as well as provide economic benefits to the state. Nonresident visitation could be affected, although not greatly, by the various alternatives. These impacts briefly are discussed under the individual alternatives. Annual growth rates for nonresident recreation recently were estimated in a USFS study, providing the basis for this analysis (Bowker et al. 1999).

Alternative A

Recreation Management

Surface-disturbing Activities. Under Alternative A, approximately 59,990 short-term and 21,087 long-term acres of BLM-administered surface are expected to be disturbed by BLM actions over the life of the plan (Appendix M). These management actions could cause direct and indirect adverse impacts to recreation resources as conflicts between recreational use and development occur in developed areas. The quality of dispersed recreation would diminish over time in areas where large-scale development occurs. The impacts to recreation from surface-disturbing activities under Alternative A, while minor, are anticipated to be adverse and similar in type to all other alternatives; however, the intensity of adverse impacts varies by alternative. Alternative A projects the second lowest acreage of surface disturbance among the alternatives.

Withdrawals and Closures to Mineral Resources. The impacts to recreation from closures and withdrawals under Alternative A are anticipated to be beneficial and similar in type to all other alternatives. However, the intensity of adverse impacts varies by alternative. The greater the acreage withdrawn or closed to mineral entry, the greater the beneficial impact to recreation. Alternative A withdraws or closes the least acreage of all the alternatives and, therefore, is considered the least beneficial to recreational uses of the land.

Special Recreation Management Areas

Proactive Recreation Management Actions. Under Alternative A, the following four existing SRMAs continue (see Table 4-14):

- Muddy Mountain EEA
- Goldeneye Wildlife and Recreation Area
- North Platte River
- Middle Fork SRMA (in cooperation with BLM's Buffalo and Worland field offices).

The existing NSO restriction within the Muddy Mountain EEA, along with the protective withdrawal segregating the area from operation of the public land laws, protects the recreational values of this SRMA. The existing closure to livestock grazing limits conflict between recreational users and livestock use. Vegetation treatments, if any, cause minimal short-term displacement of recreational use from areas where forest-management activities occur.

In the North Platte River SRMA, the development of new facilities, road upgrades, and reclamation of heavily impacted areas enhance river-related activities and user experiences. Developing recreational facilities would mitigate environmental impacts related to recreational use.

For the Goldeneye Wildlife and Recreation Area, an SRMA identification enables the BLM to respond to recreation management needs in a timely manner, while an ERMA identification may not.

As an area of long-standing interest to recreationists from Wyoming, the Middle Fork area benefits by being identified as an SRMA. Problems created by high recreation use adversely affecting the setting (primarily OHV use) have a much better chance of being addressed if identified as an SRMA.

Recreational Use

Other Resource Management Actions. Consolidating land ownership and additional public access to lands within the planning area increases recreational opportunities for recreational users seeking both primitive and more-developed recreational experiences.

Managing certain resources could influence recreational use patterns, opportunities, and preferences within the planning area to a limited extent. For example, current management actions for vegetation, water, soil, livestock grazing, and fire management actions are anticipated to influence the distribution of fish and wildlife throughout the planning area, thereby influencing recreational use. Increases in fish and wildlife populations translate to increased recreational opportunities, such as hunting, fishing, and viewing wildlife.

Cultural, paleontological, and VRM limitations could preclude the development of recreational facilities and opportunities in localized areas by protecting resources of interest. Forest-management activities would temporarily displace recreational use from areas where vegetation treatments occur, but would be of short-term duration and limited to specific locations within the planning area. None of these actions substantially alter the opportunities for, or distribution of, recreation activities within the planning area.

Under Alternative A, the established protection measures benefit recreation because of the direct link between recreational use (fishing, hunting, wildlife viewing, and photography) related to these resources. Under this alternative, nonresident visitation would increase in the short-term by about 0.5-percent annually. Non-resident recreational visitation would increase annually in the short-term by 0.5 percent for hunter, 1.0 percent for fishing, and 1.5 percent for other dispersed recreation under this alternative (Bowker et al. 1999; Bennett 2004).

Alternative B

Recreation Management

Surface-disturbing Activities. Under Alternative B, approximately 36,650 short-term and 11,565 long-term acres of BLM-administered surface acres are expected to be disturbed by BLM actions over the life of the plan (Appendix M). These management actions could result in direct and indirect adverse impacts to recreation resources as conflicts between recreational use and development may occur in all disturbed (commercially developed) areas. The quality of dispersed recreation would diminish over time, but only in areas where large-scale development occurs. Potential adverse impacts to recreation resources from

surface-disturbing activities under Alternative B would be less than those identified under Alternative A. Alternative B projects the lowest acreage of surface disturbance among the alternatives.

Withdrawals and Closures to Mineral Resources. The impacts to recreation from closures and withdrawals under Alternative B would be beneficial and similar in type to all other alternatives. Alternative B closes and withdraws more acreage to mineral resources than all other alternatives, resulting in the greatest beneficial impact to recreation of all alternatives.

Special Recreation Management Areas

Proactive Recreation Management Actions. Because the Muddy Mountain EEA would be closed to oil and gas leasing and geophysical operations, more protection for the recreational resources would be provided under this alternative than under Alternative A. Alternative B also provides for the least amount of forest-management activities in the Muddy Mountain EEA and, accordingly, poses the least potential to adversely affect recreational uses.

Compared to Alternative A, removing Goldeneye Wildlife and Recreation Area as an SRMA would result in an adverse impact to recreation resources.

Management actions proposed for the Middle Fork SRMA provide additional protection and recreational opportunities. The recreational setting is enhanced through the long-term. The quality of recreation experiences would improve and benefits from recreational activities increase. The North Platte River is managed as an ACEC.

Expansion of the Poison Spider OHV Park provides additional long-term recreational opportunities in this area. Further analysis of OHV use is included in the OHV section of this chapter.

Recreational Use

Other Resource Management Actions. Under Alternative B, management actions concerning vegetation, water, soil, livestock grazing, and fire would enhance fish and wildlife habitats throughout the planning area and preserve the landscape aesthetics for recreation to a greater extent than under Alternative A.

The increased restrictions would further protect resources of interest to the recreating public. Because forestlands would be managed for watershed stability, wildlife habitat, and recreational considerations, beneficial long-term impacts to recreation would occur.

Under Alternative B, nonresident visitation to the area would increase by about 1.3-percent annually through the short term. Non-resident recreational visitation would increase annually in the short-term by 1.3 percent for hunter, 0.8 percent for fishing, and 3.8 percent for other dispersed recreation under this alternative (Bowker et al. 1999; Bennett 2004).

Alternative C

Recreation Management

Surface-disturbing Activities. Under Alternative C, approximately 58,689 short-term and 20,358 long-term acres of BLM-administered surface acres are expected to be disturbed by BLM actions over the life of the plan (Appendix M). These management actions could result in direct and indirect adverse impacts to recreation resources as conflicts between recreational use and development may occur in disturbed (commercially developed) areas. The quality of dispersed recreation would be diminished over time in areas where large scale development occurs. Potential adverse impacts to recreation resources from

surface-disturbing activities under Alternative C are similar to those identified under Alternative A. Alternative C projects the third lowest acreage of surface disturbance among the alternatives.

Withdrawals and Closures to Mineral Resources. The impacts to recreation from closures and withdrawals under Alternative C would be beneficial and similar in type to all other alternatives. Alternative C withdraws and closes more acreage to mineral resources than Alternative A and the second highest acreage of all alternatives.

Special Recreation Management Areas

Proactive Recreation Management Actions. The impacts from proactive recreation management actions under Alternative C are the same as those identified under Alternative B, except for the following; the Muddy Mountain EEA would have slightly less protection than Alternative B, although actual recreational use would remain unchanged and recreational opportunities from an expanded Poison Spider OHV Park would be somewhat greater. These adjustments are minor and the nature and intensity of impacts to recreation resources would be the same as those identified in Alternative B.

As an SRMA, managing recreational use of NHTs and other historic trails would be similar to statewide management of those trails. Recreational management of places such as Ryan (Prospect) Hill and Bessemer Bend would be a priority. Funding for management and maintenance, while not assured, would be more likely than if the areas were managed as an ERMA.

Recreational Use

Other Resource Management Actions. Impacts to recreation under Alternative C as a result of vegetation, water, soil, and fire management are similar to those under Alternative B, but to a somewhat limited extent due to a slight relaxation of restrictions under this alternative.

Cultural, paleontological, and VRM restrictions under Alternative C are more stringent than under Alternative A and less stringent than under Alternative B. These restrictions would not result in substantial differences in impacts to recreational resources.

A moderate relaxation of protective actions would be realized under Alternative C in relation to fish and wildlife management. Beneficial impacts described for Alternative B would, therefore, be expected under Alternative C, but to a lesser extent and would still be greater than those afforded under Alternative A.

Under Alternative C, visitation to the area by nonresidents would increase by about 0.8 percent per year through the short term. Non-resident recreational visitation would increase annually in the short-term by 0.8 percent for hunter, 0.8 percent for fishing, and 3.8 percent for other dispersed recreation under this alternative (Bowker et al. 1999; Bennett 2004).

Alternative D

Recreation Management

Surface-disturbing Activities. Under Alternative D, approximately 63,649 short-term and 22,080 long-term acres of BLM-administered surface acres are expected to be disturbed by resource development actions over the life of the plan (Appendix M). These actions would result in direct and indirect adverse impacts to recreation resources as conflicts between recreational use and other resource development occurs. The quality of dispersed recreational experience opportunities would diminish over time in areas where intensive development occurs. Potential adverse impacts to recreation resources from surface-disturbing activities under Alternative D are similar to, but greater than, those identified under Alternative A.

Withdrawals and Closures to Mineral Resources. The impacts to recreation from closures and withdrawals under Alternative D would be beneficial and similar in type to all other alternatives. Alternative D removes or closes the fewest acres to mineral development, resulting in the least beneficial impact to recreation of all alternatives.

Special Recreation Management Areas

Proactive Recreation Management Alternatives. Under Alternative D, eight SRMAs are identified including all four existing SRMAs (refer to Table 4-14).

Accelerated forest-management activities in the Muddy Mountain EEA under Alternative D would have minor, short-term adverse impacts on recreational use of the area. Subsequent mineral location in the area would adversely impact the recreational resources for which the area was established by increasing surface disturbance.

The Goldeneye Wildlife and Recreation Area would continue to be managed for wildlife resources. The NSO restrictions would be carried forward within the boundary, continuing to protect the area from surface-disturbing activities; all other protective measures would be removed.

Under Alternative D, the North Platte River, managed as an SRMA (2,238 acres of BLM-administered surface), continues and includes the Trapper's Route Landing Sites and public lands within ¼ mile on either side of the river from the high water mark between Pathfinder Reservoir and Casper. The lessening of restrictions on this portion of the river adversely affects the recreational setting and, as a result, adversely affects recreational experience opportunities.

While SRMAs may incorporate management actions to enhance and protect recreational values, they do not preclude development of other, often competing resources. Since this alternative emphasizes resource use over resource conservation, it can be expected that recreation uses would be in more direct competition with other resource use opportunities. The less stringent management prescriptions for the Muddy Mountain EEA SRMA and the North Platte River SRMA would result in long-term adverse impacts when compared to alternatives A and B. Proactive recreation management actions under Alternative D, while beneficial, are the least beneficial of all alternatives. Refer to Table 4-14 to compare the number of SRMAs by alternative.

Recreational Use

Other Resource Management Actions. Management actions and related impacts under Alternative D are similar to those described for Alternative A with regard to impacts from vegetation, fire, cultural, paleontological, and livestock resources, but would be less restrictive. The lesser restrictions are not expected to impact recreational use patterns to a substantial degree, with the exception of the revocation of all SDW withdrawals, which would likely preclude the use of these areas for heritage tourism. In addition, visual resources would be managed in accordance with the 2004 inventory, which more accurately categorizes the visual resources of the planning area and provides for more suitable management of the resource. Visual resources of interest would be better protected, providing for long-term protection of key aesthetic resources.

While seasonal motorized vehicle restrictions in crucial big game areas would be carried forward under Alternative D, all other wildlife management actions afford the least protection to wildlife resources under this alternative. Alternative D would have the greatest potential for degrading the wildlife resource, which could adversely impact recreational users relying on wildlife resources. At the same time, relaxation of protective measures provide minor benefits to recreational users seeking a more rural and

(or) motorized recreational experience, since this alternative affords the least restriction to access. However, this alternative could have an adverse impact on the quality of the recreational experience.

Alternative D has the greatest potential for access and road infrastructure acquisition; however, it also has the most potential to displace recreational users and diminish the quality of recreational experiences throughout the planning area, including areas known to have sensitive resource values.

Under this alternative, visitation by nonresidents to the area would increase by about 0.5-percent annually through the short term. Non-resident recreational visitation would increase annually in the short-term by 0.5 percent for hunter, 0.8 percent for fishing, and 0.9 percent for other dispersed recreation under this alternative (Bowker et al. 1999; Bennett 2004).

Alternative E (Preferred Alternative)

Recreation Management

Surface-disturbing Activities. Under Alternative E, approximately 61,274 short-term and 21,672 long-term acres of BLM-administered surface acres are expected to be disturbed by BLM actions over the life of the plan (Appendix M). These management actions could result in direct and indirect adverse impacts to recreation resources, as conflicts between recreational use and development may occur in disturbed (commercially developed) areas. The quality of dispersed recreation would be diminished over time in areas where large scale development occurs. Potential adverse impacts to recreation resources from surface-disturbing activities under Alternative E are similar to those identified in Alternative A (Appendix M). Alternative E projects the second highest acreage of surface disturbance among the alternatives.

Withdrawals and Closures to Mineral Resources. The impacts to recreation from closures and withdrawals under Alternative E are beneficial and similar in type to all other alternatives. Alternative E is more beneficial to recreation than alternatives A and D, but less beneficial than alternatives B and C.

Special Recreation Management Areas

Proactive Recreation Management Alternatives. The impacts from proactive recreation management actions under Alternative E would be the same as those identified under Alternative B, except for the following; the Poison Spider OHV Park would be expanded by 98 acres (to 285 acres). These adjustments are minor and the overall intensity of impacts to recreation resources are the same as those identified in Alternative B.

Recreational Use

Other Resource Management Actions. Management actions and related impacts under Alternative E proactively identify and pursue opportunities to acquire public access to areas with high recreational use value within the planning area to increase recreational opportunities for the public. Impacts are similar to those described for Alternative A.

Management actions and related impacts under Alternative E are similar to those described for Alternative A with regard to impacts from vegetation, fire, cultural, paleontological, and livestock resources. Visual resources would be managed in accordance with the updated visual inventory, which manages the current visual resource conditions and more accurately provides for the protection of key aesthetic values impacting the quality of recreational experiences.

Fewer adverse impacts on recreational users are expected due to the minor changes in protective actions to fish and wildlife habitats under Alternative E. Minor beneficial impacts to recreational users seeking a rural and (or) motorized recreational experience would exist because this alternative provides fewer

access restrictions than does Alternative A. Beneficial impacts would be greater and the adverse impacts less under Alternative E than under Alternative A.

If parcels of public lands were disposed of that had legal public access, were of sufficient size to support recreational activities, or were adjacent to state or other public lands, their loss would be an adverse impact to recreational use of the public lands.

Non-resident recreational visitation would increase annually in the short-term by 1.3 percent for hunter, 0.8 percent for fishing, and 0.9 percent for other dispersed recreation under this alternative (Bowker et al. 1999; Bennett 2004).

4.6.7.3 Conclusion

Allowable uses and management actions described in this section for the various alternatives were used to forecast impacts to recreation resources. Meaningful differences in surface disturbance, areas closed or withdrawn from mineral development, proactive recreation management actions, and other resource management actions form the basis for the following conclusion: impacts to recreation resources from the alternatives are anticipated to be similar in type, but different in intensity.

Although none of the alternatives is expected to impact recreational use, distribution, or experience opportunities substantially, Alternative B enhances the recreational experience of users expecting a more primitive recreational experience more than any of the other alternatives by limiting development to the greatest extent. Alternative B provides the greatest protection for wildlife resources, providing long-term benefits to hunters. Alternative C proposes the most acreage of BLM-administered surface (206,155) and the most acreage of BLM-administered mineral estate for the South Bighorns/Red Wall SMA, which emphasizes recreation and wildlife. The special designations and SRMAs proposed under Alternative C provide more recreation opportunities compared to Alternative A. Alternative D provides more access, which benefits some recreational users, but also allows for the greatest amount of development. More development adversely impacts recreational users, especially those seeking recreational experiences in undisturbed settings or recreational experiences dependent on significant fish and wildlife populations.

In general, displacement of dispersed recreational use tends to be localized and result from management activities related to competing resource-development activities. Long-term displacement occurs where concentrated, large-scale development is located. Such development could reduce the quality of the recreational experience and displace recreational users over time, but would be spatially limited. Management actions directed at improving recreational opportunities enhance both primitive and developed recreational experiences.

Alternative E provides more balanced recreation experience opportunities for both natural and modified settings as compared to alternatives B and D. Alternative E provides the most flexibility for management to enhance the recreational experience of those users wanting a more developed (rural) recreational experience, as well as more natural settings for recreational activities.

4.7 Special Designations

Special Designations provide specific areas with special management for unique natural, historic, scenic, or recreational resources in the planning area. Management of special designations on public lands administered by the BLM is directed by a variety of laws, regulations, policies, and other requirements. The Casper Field Office operates under the protocols set forth in Appendices B, K, and M. The remainder of the Special Designations section discusses ACECs, SMAs, National Back Country Byways, NHTs and Other Historic Trails, and Wild and Scenic Rivers.

4.7.1 Areas of Critical Environmental Concern and Special Management Areas

This section presents an analysis of management actions involving 11 proposed or existing special designations (seven ACECs and four SMAs) within the planning area (see Table 4-15). The discussions are organized alphabetically first by existing ACECs, then proposed ACECs/SMAs. A brief introduction is provided for each area, followed by a focused analysis of potential impacts. The ACEC/SMA analysis, unlike the other analyses in this chapter, considers the impacts of special designations on other resources within the field office rather than how other resources would impact the areas themselves. This decision is based on the following assumptions: (1) special designations are established and managed in a manner to protect specific resources within their boundaries; therefore, resources not specifically protected may be impacted by these designations; and (2) to make management choices between alternatives, information on the impacts on other resources from special designations is necessary.

Table 4-15. Proposed and Existing ACECs/SMAs by Alternative

Name	Alternatives				
Existing ACECs					
	A	**B**	**C**	**D**	**E**
Jackson Canyon	ACEC	ACEC	ACEC	ACEC	ACEC
Salt Creek Hazardous Area	ACEC	ACEC	ACEC	-	-
Proposed ACECs/SMAs					
Alcova Fossil Area	-	ACEC	ACEC	SMA	ACEC
Bates Hole	-	SMA	SMA	-	SMA
Black-tailed prairie dog	-	ACEC	ACEC	-	-
Cedar Ridge TCP	-	ACEC	SMA	-	-
North Platte River	-	ACEC	ACEC	-	-
Salt Creek	-	-	SMA	SMA	SMA
Sand Hills	-	SMA	SMA	-	SMA
South Bighorns/Red Wall	-	ACEC	SMA	-	SMA
Wind River Basin	-	-	SMA	SMA	SMA

ACEC Area of Critical Environmental Concern
SMA Special Management Area
\- No Special Designation Under This Alternative

The impact analysis takes into account impacts from the administrative action of designating a specific area, the management plan that would follow, and implementing that management plan over time. At this time, general assumptions are used because, with the exception of Jackson Canyon and the Salt Creek Hazardous ACECs, detailed management plans and implementation programs for the 11 areas are not available. The management plans under the ACEC and SMA designations are not substantially different because their primary objectives and secondary responsibilities for managing other resources are similar. An ACEC is a regulatory designation created in the FLPMA and can be established only during the land use planning process. An SMA, on the other hand, is a management decision and can be established at any time as long as the SMA conforms to the current RMP. Management assumptions are the basis for

the impact analyses that follow. Where appropriate, uncertainties (i.e., a lack of available data or incomplete information) are identified.

The following discussions are limited to important considerations and impact findings as compared with the existing conditions in the planning area. If a potential impact is (1) virtually identical for all alternatives, (2) inconsequential, or (3) otherwise minor relative to other issues, it is either noted for clarification or not mentioned. This approach to the analysis avoids presenting redundant and unnecessary discussions. In general, each analysis covers a selected set of environmental disciplines and generally presents the issues in order of importance.

Jackson Canyon ACEC (Existing)

Maintaining and enhancing the quality of the bald eagle winter roost and associated habitat is the primary objective of the Jackson Canyon ACEC. Each of the alternatives incorporates most of the management prescriptions defined in the Bald Eagle Habitat Management Plan. In general, little difference exists among alternatives with respect to impacts on bald eagles and roost areas.

The Jackson Canyon ACEC is in south-central Natrona County at the western end of Casper Mountain. Impacts analyzed for the ACEC are limited to the area within this boundary.

4.7.1.1 Methods and Assumptions

Methods and assumptions used in this impact analysis are identified at the beginning of Chapter 4:

4.7.1.2 Analysis of Alternatives

Impacts Common to All Alternatives

Under all alternatives, the Jackson Canyon ACEC is retained and the existing boundary is revised by enlarging it approximately ¼ mile to the south, making use of topographic features to screen bald eagle roosts. Under all alternatives, developing existing oil and gas leases is subject to an NSO restriction, a condition of those existing leases. All federal mineral estate in the ACEC remains available for oil and gas leasing, with any leases issued subject to the NSO restriction. The NSO restriction requires drilling outside the ACEC boundary, increasing costs of drilling and production.

Mining is not allowed within the ACEC and the public surface and federal mineral estate are withdrawn from location and appropriation under the mining laws. Considering the amount and quality of limestone and its proximity to the city of Casper, this removes an important source of commercial material from development.

Alternative A

Vegetative treatments are used to manage forests within the Jackson Canyon ACEC, but approximately 163 acres of commercial forest within the Jackson Canyon ACEC can not be commercially harvested in the roost area. Timber is actively managed to maintain healthy-aged and structured stands for the benefit of bald eagle roosting habitats. Managing to achieve DFC within Jackson Canyon ACEC forest and woodlands enhances species diversity and composition. Woodland species composition and habitats within existing woodland communities are conserved over the long term. Forest management treatments would be used within the ACEC to thin stands, control pine beetles, and improve stand condition. Beetle control has provided a source for firewood and the product is sold to local vendors and private permittees. The practice provides a forest product but increases traffic within the ACEC both on and off road. The November 1 to March 31 restriction on burning and OHV travel within the ACEC results in curtailing slash disposal and hazard reduction during a burn window that seasonally provides the most opportune time for burning.

Revising the boundary on the eastern end of the ACEC by approximately 1,400 acres would not appreciably affect any other resource; however, moving the boundary away from encroaching development on the east eliminates some of the private land and federal minerals within the present ACEC.

In the event of a wildland fire, Alternative A requires the use of full suppression tactics to protect the Jackson Canyon ACEC. Over the long term, emphasis on full-suppression tactics under Alternative A contribute toward higher fuel loads and, consequently, a greater risk of high-intensity fire in the area. Alternative A makes use of prescribed fire for achieving forest and range objectives. Using unlimited suppression tactics inside the ACEC increases the potential of adversely affecting ACEC quality and could impact roost sites.

Alternative A allows for improved access to the archery range located adjacent to the eastern boundary of the ACEC. The allowance is for a 60-foot road that meets county requirements. If the road is built across the archery range, it is likely that OHV use would increase in the ACEC. Impacts to roosting depend on the time of year and intensity of OHV use.

Alternative B

Under Alternative B, impacts to forest production are the same as described under Alternative A.

Alternative B restricts road expansion and new road construction during fire suppression. The alternative does not allow road construction or grading for wildland fire control. Restricting heavy equipment could result in a fire escaping the ACEC, which could directly impact residences and cabins. These provisions are expected to reduce surface disturbance.

Under Alternative B, the boundary adjustments on the eastern portion of the ACEC would not be made. Bald eagle habitat objectives on split-estate lands are better met, as these lands would remain under ACEC management.

Management actions and resulting impacts to recreation under Alternative B are essentially the same as under Alternative A, with the exception of not upgrading the road to the archery range under Alternative B, which would have only a minor impact on future recreation opportunities.

Alternative C

Under Alternative C, impacts to forest production are the same as described under Alternative A, except, that forest management around bald eagle roosts would manage stands for old growth. In addition, Alternative C allows the use of temporary skid trails to promote forest management and product removal. This may result in short-term adverse impacts to wildlife in the area; however, these activities are prohibited from November 1 to March 31 to protect the eagle roost. Impacts on fire management are the same as described under Alternative B. Boundary adjustments on the eastern portion of the ACEC would be made with impacts identical to those described under Alternative A.

Alternative D

Under Alternative D, commercial harvest is allowed within the ACEC to meet bald eagle management objectives, but would not be allowed to meet BLM's commercial harvest quotas. Allowing commercial harvest increases the amount of commercial forest products within the ACEC and increases impacts to soil, vegetation, and water in the short term.

Fire suppression under Alternative D is the same as under Alternative A. Grading of roads is not allowed during fire suppression activities and prescribed fires are used to meet bald eagle habitat, livestock grazing, and forestry objectives, with impacts being the same as described for Alternative B.

Boundary adjustments on the eastern portion of the area are made with impacts identical to those described under Alternative A. Impacts to recreational resources as a result of the archery range road upgrade are also identical to Alternative A.

Alternative E (Preferred Alternative)

With the exception of forest production, Alternative E has the same impacts on the management of other resources as described under Alternative A.

Under Alternative E, forest management to reduce fuel loads and disease is compatible with the Bald Eagle Management Plan objectives. Alternative E seeks to actively manage forest stands by reducing fuel loads and managing beetle infestations and disease. As stated in Alternative C, temporary skid trails are permitted; however, under Alternative E, this trail would be closed and reclaimed once activities are completed. This could result in a minor, long-term beneficial impact by improving overall health of forest stands in the ACEC as well as providing a small local flow of wood products. This action would adversely impact recreation, but have a beneficial impact to wildlife resources.

4.7.1.3 Conclusion

All alternatives continue the protection of Jackson Canyon ACEC and the associated bald eagle roosts. Surface disturbance restrictions, locatable mineral withdrawals, and mineral materials restrictions are identical across all alternatives. Management actions under alternatives A and E are most restrictive to other resources due to the general provisions for wildland fire control and providing the greatest long-term benefit for wildlife (especially bald eagles), vegetation, soils, water resources and forest and woodlands. Forest management and harvest would be allowed to a greater degree under Alternative D. Alternative D could have the most beneficial impact to forests and woodland products.

Salt Creek Hazardous Area ACEC (Existing)

The BLM designated the Salt Creek Hazardous Area ACEC to reduce environmental hazards caused by impacts from oil and gas production in oil fields along the Salt Creek drainage. The BLM also designated it to improve air and water quality, promote public safety, increase resource utility, improve visual resources, and enhance vegetative growth. The BLM initially established the ACEC to address watershed and environmental issues created by 80 years of oil field development.

The Casper Field Office did not implement most of the provisions in the ACEC management plan because of budget constraints. Although the field office was unable to adhere to the ACEC plan, operators substantially reduced environmental hazards in the oil fields in the ACEC area since the early 1980s, mainly as a result of working with the BLM on a case-by-case basis. Operators have installed warning signs to make the public aware of hazards, have reclaimed numerous oil and gas well sites, and have cleaned up numerous oil spills. Although environmental hazards have been reduced, a substantial amount still exists and more work needs to be done to mitigate impacts to other resources. INPS, such as salt cedar and Russian knapweed, have spread throughout the area due to surface disturbance associated with oil and gas development and grazing practices.

Approximately 235,325 acres (77,566 acres of BLM-administered surface and 203,228 acres of BLM-administered mineral estate) of the original Salt Creek Hazardous Area ACEC lie within the planning area in northeastern Natrona County and northwestern Converse County. The remaining portion of the ACEC

is located in Johnson County, which is under the jurisdiction of the Buffalo Field Office. However, the Buffalo Field Office did not carry it forward in their most recent RMP revision.

The Casper Field Office portion of the Salt Creek Hazardous Area ACEC contains 23,179 acres of high oil and gas development potential, 210,641 acres of low oil and gas development potential, and 1,505 acres of very low oil and gas development potential based on the RFD (BLM 2005f). Based on GIS data, the area contains eight greater sage-grouse leks, of which two are on BLM-administered surface, seven of which are on BLM-administered mineral estate, and 12,001 acres of highly erosive soils.

4.7.1.4 Methods and Assumptions

Methods and assumptions used in this impact analysis are identified at the beginning of Chapter 4.

4.7.1.5 Analysis of Alternatives

Impacts Common to All Alternatives

Impacts of the Salt Creek Hazardous Area ACEC vary by alternative, as described below.

Alternative A

Under Alternative A, the BLM manages the ACEC to meet the goals and objectives outlined in the ACEC plan, makes efforts to secure cooperative agreements with private landowners and developers as well as potentially assisting in the clean-up of existing hazards in the area. The BLM would prescribe cultural surveys for the area with the goal of identifying and protecting historical sites still in the ACEC area having a beneficial impact to heritage resources. Amoco conducted a block cultural survey of the Salt Creek light oil unit between 1988 and 1989, but this area represents only a small portion of the total ACEC area. Under Alternative A, soil, water, vegetative, and visual resources benefit due to monitoring produced water and stream quality, conducting field inspections on an annual basis, and continuing clean-up of environmental hazards.

Alternative B

Under Alternative B, the BLM retains the ACEC and implements the original management plan. Impacts to resources are the same as for Alternative A.

Alternative C

Alternative C modifies the ACEC boundary to include only the portion of the ACEC in the planning area. The boundary adjustment is an administrative issue and only slightly changes the strategy for managing resources within the Salt Creek Hazardous Area ACEC. Impacts are the same as described in Alternative A, but would occur over a smaller area.

Alternative D

Alternative D removes the ACEC designation. The BLM handles environmental hazards on a case-by-case basis. This directive is consistent with current management directives in the rest of the planning area. This management practice is not as effective as a comprehensive management plan, so there would likely be more adverse impacts to other resources from environmental hazards under this alternative.

Alternative E (Preferred Alternative)

Alternative E does not retain the ACEC, and the impacts are the same as Alternative D, with the exception of INPS. Under Alternative E, the BLM would implement a weed-management plan according

to directives under INPS alternatives. Implementing a weed-management plan would reduce the spread of weeds in the Salt Creek drainage area and have a beneficial impact on biology and land resources.

4.7.1.6 Conclusion

Alternatives A, B, and C retain the existing Salt Creek Hazardous Area ACEC designation with Alternative C managing less area than alternatives A and B. Under alternatives A and B, management actions are implemented to monitor water quality, inventory cultural resources, and secure cooperative agreements with operators to clean up the existing hazards. Under alternatives D and E, the BLM would not retain the ACEC designation and would address environmental hazards on a case-by-case basis. Again, operators would clean up the area with the BLM's cooperation. The difference in both beneficial and adverse impacts among all alternatives is negligible.

Alcova Fossil Area ACEC/SMA (Proposed)

The Alcova Fossil Area is a collective term used to designate specific public lands around the Alcova Reservoir. The ACEC/SMA size and location varies by alternative, the largest of which encompasses lands on both the north and south sides of Alcova Reservoir (7,073 acres).

4.7.1.7 Methods and Assumptions

Methods and assumptions used in this impact analysis are identified at the beginning of Chapter 4.

4.7.1.8 Analysis of Alternatives

Impacts Common to All Alternatives

Impacts to the Alcova Fossil Area vary by alternative, as detailed in the discussion below.

Alternative A

Alternative A provides for certain protections on 1,163 acres as described below. As use increases in this area, the potential for theft and vandalism also increases. Impacts due to theft and vandalism diminish the value of paleontological resources.

Alternative A involves further field investigations, including potentially identifying additional paleontological resources, which could benefit scientific knowledge. However, this knowledge would not be available to the public because no on site resource interpretation would be done.

Under Alternative A, the Alcova Fossil Area is evaluated for importance and withdrawn from operation of mining laws, if appropriate. The withdrawal would be pursued for the entire area. NSO would be allowed inside the withdrawal area.

Under Alternative A, the potential resource management actions within this area are not expected to create visual impacts and generally would be consistent with the 1985 VRM class management, designating this area as Classes III and IV.

Alternative B

Alternative B designates 6,913 are BLM-administered lands on both the north and south sides of the Alcova Reservoir as an ACEC, provides no visitor facilities, and limits surface-disturbing activities unless they are for scientific purposes. The potential for inadvertent impact, vandalism, and deterioration of the value of paleontological resources remains, but could be addressed in various ways in the management plans created following the ACEC designation. Similar to Alternative A, Alternative B provides further field investigations with the potential for identifying additional paleontological resources, which could

benefit scientific knowledge. However, this knowledge would not be available to the public in terms of on site resource interpretation. If noteworthy resources were identified, Alternative B would be more beneficial than Alternative A because special management practices and policies could be put into place to address new information more easily.

Surface-disturbing activities, such as those associated with geophysical exploration, are prohibited under Alternative B and, as with Alternative A, a mineral withdrawal would be pursued. As under Alternative A, there would be no prohibitions on oil and gas leasing; permanent structures would not be allowed and all development would be limited to directional drilling. Since this alternative involves a larger area, there would be a greater adverse impact to geophysical exploration and locatable mineral entry than under Alternative A. Given the limited area involved, mineral withdrawal and NSO restriction policies overall would have minor industrial productivity, energy, and economic impacts.

The potential resource management actions within the ACEC under Alternative B are not expected to create visual impacts and are consistent with the VRM policies of Alternative B. Managing resources under the ACEC designation would place more restrictions on development and use of other resources, thereby increasing the potential for meeting visual quality goals compared to Alternative A.

Alternative B has an adverse impact on recreation by closing the ACEC to OHV use. This closure has minor beneficial impacts on paleontological resources within the ACEC because it reduces the potential for inadvertent damage. Other than the restriction of OHV activities, Alternative B does not have a direct impact on the recreational potential of the area.

The NSO restriction could impact the accommodation of ROWs through the Alcova Fossil Area. Avoidance areas for ROWs have been established within the planning area. Communication site windows are outside of the proposed ACEC boundaries. Acquisition of lands and interests in lands in the area will be pursued, expanding the area to a minimal extent and providing both access to, and acquisition of, important resources.

Alternative C

Alternative C is identical to Alternative B, except the ACEC is smaller (5,805 acres of BLM administered lands on the south side of Alcova Reservoir) and development of visitor interpretation facilities is limited. The smaller ACEC has a similar amount of adverse and beneficial impacts compared to Alternative B. Alternative C has a greater adverse impact on geophysical exploration than Alternative A because it involves a larger area. Under Alternative C, impacts to oil and gas drilling and production are the same as under Alternative B, but would be less given the smaller area within the proposed boundary.

The potential to achieve VRM goals increases under Alternative C compared to Alternative A, but would be virtually the same as under Alternative B. The potential resource management actions within this area are subject to VRM class management under current inventory, designating this area as Classes II and III.

The visitor interpretation facilities and efforts to publicize them would have recreational benefits, but could lead to an increased potential for vandalism. Vandalism could be addressed by details in the management plan created following the ACEC designation. Acquiring lands and interests in lands in the area would be pursued, expanding the area to a minimal extent and providing both access to, and acquisition of, important resources.

Alternative D

Alternative D is similar to Alternative C, but involves establishing an SMA rather than designating an ACEC on the same 5,805-acre area on the south side of Alcova Reservoir.

Surface disturbance is allowed if paleontological resources are protected. This allows more industrial development of the area than under alternatives A, B, and C. OHV use would be limited in sensitive areas only, which would be less restrictive than alternatives B and C but slightly more restrictive than Alternative A. Alternative D includes more visitor facilities than alternatives A, B, and C.

Alternative D provides slightly less protective management of paleontological resources than alternatives B and C, but more than Alternative A. The size of the SMA indicates that the beneficial and adverse impacts of Alternative D are more similar to Alternative C than to Alternative B.

Under Alternative D, geophysical exploration projects are evaluated on a case-by-case basis to determine potential degradation of the paleontological resources. A determination of no degradation would allow exploration. If degradation is determined to be likely, then exploration within the area would not be permitted. Alternative D has less adverse impacts than Alternative A because NSO is allowed. Under Alternative D, oil and gas drilling or production facilities would be allowed if development did not cause undue degradation of paleontological resources within the SMA and would result in less adverse impacts than Alternative A.

Under this alternative, mining for locatable minerals is allowed. If mining occurs without proper mitigation, the paleontological resources could be destroyed. Partial mitigation, through periodic monitoring, would lessen the adverse impacts to the resource. The BLM promotes cooperative recovery efforts with claimants should sensitive resources be discovered.

Alternative E (Preferred Alternative)

Impacts under Alternative E are similar to those described under Alternative C. The same area is designated as an ACEC (5,805) acres on the south side of Alcova Reservoir). Under Alternative E, limitations on surface-disturbing activities to conserve paleontological resources within the designated ACEC are greater than under Alternative A. Alternative E has a greater adverse impact on geophysical exploration and locatable minerals than Alternative A due to the increased spatial area. Under Alternative E, impacts to oil and gas drilling and production are similar to those under Alternative D, as proposed surface-disturbing activities would be evaluated on a case-by-case basis. A mineral withdrawal would be pursued. Because of the same size of the area, impacts are the same as described under Alternative C.

The potential to achieve VRM goals increase under Alternative E compared to Alternative A. The potential resource management actions within this area are subject to VRM class management under current inventory, designating this area as Classes II and III.

Developing visitor interpretation facilities and allowing some OHV use benefits recreation, but could lead to increased vandalism on paleontological resources by drawing additional people to the area. This potential for vandalism could be addressed in the management plans created following the ACEC designation. If noteworthy paleontological resources are identified, Alternative E would be more beneficial than Alternative A because special management practices and policies would be put into place to address site-specific paleontological resource information more easily.

4.7.1.9 Conclusion

Alternatives B through E could provide greater benefits to the Alcova Fossil Area than Alternative A. All the alternatives have potential for adverse impacts to geophysical exploration and minerals development; the extent of these impacts varies by alternative with Alternative B having the most potential adverse impact and alternatives A and D having the least. Impacts to all other resources are expected to be minimal.

Bates Hole SMA (Proposed)

The BLM manages the proposed Bates Hole SMA to protect highly erosive soils, fragile watersheds, and important and crucial wildlife habitats, specifically greater sage-grouse habitats. Currently, the Jackson Canyon ACEC and Muddy Mountain EEA are managed as special designations within the larger Bates Hole area. They are managed according to the decisions for which they were established.

The Bates Hole area generally coincides with the Bates Creek and North Platte River-Bolton Creek watersheds. Impacts to resources are limited to those falling within the proposed 375,221-acre boundary (158,023 acres of which are BLM-administered surface lands).

4.7.1.10 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Existing and future special designations within the boundary of the proposed Bates Hole SMA are managed under the decisions for those areas.
- Impacts to existing special designations within the proposed Bates Hole SMA are not addressed in this discussion, as they are expected to be minimal.
- All surface-disturbing activities in the Bates Hole SMA under alternatives B, C, and E will be intensively managed, as described in Appendix U.
- Installing and maintaining erosion controls and other mitigation measures, such as BMPs, result in a substantial reduction in offsite erosion ranging between 40 and 97 percent depending on site conditions (USFS 2003c). However, these measures may not reduce adverse impacts on soil compaction and productivity.
- To be effective on highly erodible soils, more extensive BMPs than those commonly used are required to be installed and maintained aggressively. The risk of BMP failure is greater on highly erodible soils.
- Due to the mixed land ownership, the area is managed in cooperation with adjacent landowners.
- An oil and gas lease grants the lessee the "right and privilege to drill for, mine, extract, remove and dispose of all oil and gas deposits" in the leased lands, subject to the terms and conditions incorporated in the lease (BLM Form 3100-11, Lease for Oil and Gas).
- The Tenth Circuit Court of Appeals in Sierra Club vs. Peterson (717 F.2d 1409, 1983) found that "on land leased without an NSO stipulation, the DOI cannot deny the permit to drill…once the land is leased the DOI no longer has the authority to preclude surface-disturbing activities even if the environmental impact of such activity is significant. The Department can only impose mitigation upon a lessee who pursues surface-disturbing exploration and/or drilling activities." The court goes on to say "notwithstanding the assurance that a later site-specific environmental analysis will be made, in issuing these leases the DOI has made an irrevocable commitment to allow some surface-disturbing activities, including drilling and road building."
- Provisions in leases that expressly provide Secretarial authority to deny or restrict development in whole or in part depends on an opinion provided by the USFWS regarding impacts to endangered or threatened species or habitats of plants and animals that are listed or proposed for listing (e.g., bald eagle). If the USFWS concludes that the development would likely jeopardize the continued existence of any endangered or threatened plant or animal species, then the development may be denied in whole or in part.

4.7.1.11 Analysis of Alternatives

Impacts Common to All Alternatives

Surface-disturbing activities occur under all alternatives and BMPs for surface-disturbing activities are applied under all alternatives. Under normal circumstances, standard mitigation guidelines are effective in minimizing impacts to resources; however, conditions, such as steep slopes, highly erosive soils, or extreme environmental events may require more aggressive management actions to mitigate adverse impacts. Impacts from the Bates Hole SMA vary by alternative, as described below.

Alternative A

Under existing management practices timing limitation stipulations and CSU restrictions are used to protect big game crucial winter range and greater sage-grouse habitats. Surface-disturbing activities are prohibited on slopes greater than 25 percent and within ¼ mile of the North Platte River and 500 feet of streams, lakes, reservoirs, canals, riparian habitats, water wells, or springs. No special management actions are required to mitigate impacts to highly erosive soils.

The TLS restrictions used to protect big game crucial winter range and greater sage-grouse habitats do not prohibit development in these areas; rather, they limit the development to a time that is less disruptive to wildlife. TLS restrictions do not preserve or protect habitat so over time, development activities can reduce the amount of big game crucial winter range and greater sage-grouse habitats.

Standard BMPs and mitigation guidelines, combined with the restriction on development on slopes greater than 25 percent generally are effective in mitigating impacts to soil and water resources under normal conditions. Oil and gas production within the SMA is mature and fully developed. Current management actions have little adverse impact on oil and gas exploration and production. Under Alternative A, big game crucial winter range and greater sage-grouse habitats may be lost to development over time, resulting in a long-term adverse impact to wildlife.

The Bates Hole SMA contains substantial acreage of highly erodible soils. The lack of special management actions relating to highly erodible soils under this alternative may result in accelerated erosion and sedimentation to the North Platte River due to development activities.

Alternative B

Alternative B establishes the Bates Hole SMA on approximately 375,221 acres, of which 158,023 acres are BLM-administered surface. Under this alternative, the proposed Bates Hole SMA would have beneficial impacts on controlling soil erosion, sedimentation to the North Platte River, and important wildlife habitats. Establishing the SMA would have adverse impacts on surface-disturbing activities, mineral development, and ROW actions resulting from additional restrictions on operations.

Under Alternative B, greater sage-grouse and their habitats is a priority resource. A combination of NSO, CSU and TLS restrictions will be applied to minimize disturbance to greater sage-grouse and their habitats. Greater sage-grouse habitats will improve through vegetative treatments; residual herbaceous cover will be maintained for nesting cover. Protecting greater sage-grouse habitats will create a long-term beneficial impact.

As explained in Chapter 3, the Bates Hole SMA comprises nearly 15 percent (50,617 acres) of all the high water erosion potential soils on public land in the entire planning area. Under Alternative B, the area is intensively managed as described in Appendix U, to control soil erosion and meet watershed goals. Surface-disturbing activities are subject to a CSU restriction. A CSU restriction prohibits additional development until satisfactory mitigation is developed. Intensive management includes avoiding highly

erosive soils and full topsoil salvage, protecting surface treatments on disturbed areas within 30 days, and completing final reclamation within two growing seasons.

Management actions for this SMA would effectively control soil erosion by prohibiting surface-disturbing activities until appropriate mitigation is developed. Applying intensive management on those areas would further reduce impacts. Preventing soil erosion will benefit water quality and channel conditions in the North Platte River by minimizing sediment reaching the river. Due to the large amount of highly erosive soils and the close proximity to the North Platte River (a Class I stream), a high potential exists for beneficial impacts to both soils and water resources from the formation of this SMA.

Three and one-half percent of the proposed SMA is currently leased for oil and gas and approximately 1 percent is held by production (refer to "Held by Production" in Glossary). Forming this SMA has adverse impacts on future development by imposing additional restrictions on surface-disturbing activities, as explained above. These restrictions would impose additional costs of drilling and developing oil and gas prospects. Additional costs could make developing some prospects uneconomical to pursue; however, 96 percent of the proposed SMA is located in a very low oil and gas development potential area, with the other 4 percent rated as having no development potential. No new corridor designations are allowed under this alternative, potentially increasing the cost and time to transport the product to market.

Alternative C

Alternative C is identical to Alternative B, so the impacts of Alternative C are the same as those described for Alternative B.

Alternative D

Under Alternative D, the Bates Hole SMA is not established and management is in accordance with the RMP revision decisions for each resource or resource use in the area. Management actions for Jackson Canyon ACEC and Muddy Mountain EEA are in accordance with decisions for those areas. Direct and indirect impacts are expected to be similar to those under Alternative A. No beneficial impacts to wildlife, soil, vegetation, and water resources would exist.

Alternative E (Preferred Alternative)

Alternative E has the same impacts on the management of other resources as described under Alternative B.

4.7.1.12 Conclusion

Under alternatives B, C, and E, the proposed Bates Hole SMA has identical beneficial impacts to highly erosive soils, fragile watersheds, and important crucial wildlife habitats. Approximately 50,617 acres of highly erosive soils will be managed intensively. Soil erosion will be controlled effectively, minimizing sediment reaching the North Platte River. Thirty greater sage-grouse leks and 122,799 acres of crucial wildlife habitat will be protected.

Under alternatives B, C, and E, oil and gas leases on 3,478 acres of federal mineral estate (1% of the SMA) are held by production, an additional 13,174 acres (approximately 5% of the SMA) presently leased, and the remaining federal mineral estate (95%) is unleased. Additional constraints proposed under this SMA cannot be applied to existing leases without consent of both the lessee and the BLM; however, surface use mitigation measures can be developed through the NEPA process and applied as conditions of approval to any new development action. New leases in the remainder of the SMA will be issued with a CSU restriction and intensively managed as described above. Operations in new areas would face major constraints on surface-disturbing activities, limiting the opportunities for new exploration and production

in the SMA. Since existing fields appear to be fully developed and oil and gas development potential is low, the major constraints on new activity in this area will have limited impact on the development of oil and gas from federal minerals.

Under alternatives A and D, the Bates Hole SMA is not established; therefore, the beneficial impacts to highly erosive soils, fragile watersheds, and important crucial wildlife habitat would not occur. Oil and gas and other mineral development generally would continue as described under Alternative A.

Black-tailed Prairie Dog ACEC (Proposed)

The proposed black-tailed prairie dog ACEC helps to ensure a self-sustaining population of the black-tailed prairie dog in the planning area by focusing management on one area: to preserve black-tailed prairie dog colonies, complexes, and associated habitats.

The proposed black-tailed prairie dog ACEC comprises one township (Township 39 North, Range 74 West) in northwestern Converse County. Of the 22,937 acres in this area, approximately 3,103 surface acres (in eight different parcels) comprising 13.5 percent of the area are under BLM administration. The area comprises approximately 14,846 acres of BLM-administered mineral estate, or approximately 65 percent of the area. Impact discussions are limited to public lands falling within the proposed ACEC.

4.7.1.13 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Sylvatic plague can have disastrous impacts on prairie dog populations; no management approaches can mitigate that impact.
- Recreational shooting is considered a casual use, managed by the WGFD, and not controlled by the BLM.
- The BLM cannot dictate management of prairie dogs on private lands.

4.7.1.14 Analysis of Alternatives

Impacts Common to All Alternatives

Impacts related to designating the black-tailed prairie dog ACEC vary by alternative, as described below.

Alternative A

Black-tailed prairie dog colonies and complexes currently are not managed under any special designation within the planning area, but rather are managed in accordance with Special Status Species.

Impacts to other resources or uses are based on standard stipulations regarding prairie dog colonies. Surface development within or adjacent to black-tailed prairie dog colonies is evaluated for an action on the ground and impacts mitigated. Depending on the amount and type of mitigation, various proposed surface development may be affected in terms of time and cost. Proposed projects usually are mitigated based on avoidance of the colony, in which case impacts would be low. Surface disturbance that results in modification of a colony, including the proliferation of surface facilities near or within the colony, would directly impact black-tailed prairie dogs and indirectly impact wildlife species depending on prairie dogs for their survival. Lethal control is not used where the colony is ½ mile or more from private land, which minimizes health and safety concerns and impacts.

Alternative B

Alternative B designates a black-tailed prairie dog ACEC for the protection of prairie dog habitats. Direct and indirect beneficial impacts on associated wildlife, including black-tailed prairie dogs, are expected as a result of ACEC designation and management.

Under this alternative, the ACEC remains open to oil and gas leasing, but restricts geophysical exploration. Geophysical exploration conducted under the rights granted by the lease is allowed. These restrictions, combined with limiting oil and gas facilities to one well pad per 160 acres of federal mineral estate and rerouting linear facilities around colonies and complexes, reduces ground disturbance and benefits resources often affected adversely by surface disturbance (cultural, soil, water, vegetation, and wildlife). Directional drilling techniques would have to be used to recover resources from formations that are authorized a tighter well spacing by WOGCC, thereby increasing costs of developing those resources. If the cost associated with directional drilling makes development uneconomical, the oil and gas resources would not be recovered. Restricting geophysical exploration impacts exploration for oil and gas resources where public surface is involved. Mineral development requires the construction of access roads and transport facilities. Wildlife species depending on prairie dogs and their complexes directly benefit from the surface-development restrictions.

Within the ACEC boundary, poisoning of prairie dogs is prohibited except when human health and safety are a concern. Anti-raptor perching devices are required on facilities within ¼ mile of the ACEC. Artificial nesting structures are prohibited within the boundaries of the ACEC. Incorporating these conservation measures likely results in an increase in prairie dog population. Prairie dog expansion could benefit other wildlife species closely associated with prairie dogs (e.g., burrowing owl, swift fox). Conversely, these requirements increase developing and operating costs on permits and leases, eventually borne by the permit or lease holder. These restrictions would result in direct beneficial impacts to black-tailed prairie dog colonies and complexes in the ACEC while directly benefiting other symbiotic species.

Fire management in the ACEC is directed at establishing a natural fire regime. Fire interacts with the landscape and affects nutrient recycling, thus promoting plant productivity. Using fire to create a desired community would likely benefit grazing animals and wildlife.

Managing for the black-tailed prairie dog may create cultural and social impacts for private landowners in the ACEC. Public surface is minimal in the township, so the success of an ACEC where the goal is to increase prairie dogs would be critically dependent on private landowner cooperation.

Establishing the black-tailed prairie dog ACEC has a beneficial impact on cultural resources because surface-disturbing activities are somewhat more restrictive in degree and scope. These restrictions provide an additional level of protection to cultural resources.

Alternative C

Alternative C is identical to Alternative B and direct and indirect impacts are the same as described in Alternative B.

Alternative D

Under Alternative D, the black-tailed prairie dog ACEC is not established. The area is managed for multiple use; impacts are identical to those in Alternative A.

Alternative E (Preferred Alternative)

Alternative E is identical to Alternative A; direct and indirect impacts are expected to be the same as described under Alternative A. Prairie dogs would be managed as discussed in accordance with INPS pest control.

4.7.1.15 Conclusion

Establishing the black-tailed prairie dog ACEC under alternatives B or C could beneficially impact wildlife resources. Under alternatives A, D, or E, surface-use proposals involving public land are evaluated relative to the impact on prairie dogs where the action involves that species. In all cases, the action would be mitigated such that the impacts to prairie dogs are minimal or result in no impact.

Cedar Ridge Traditional Cultural Property ACEC/SMA (Proposed)

The Cedar Ridge TCP ACEC/SMA is proposed to protect sensitive and significant cultural values known to exist in the area.

The Cedar Ridge TCP is located in northwestern Natrona County. The area proposed for designation includes the TCP and the Periphery Area (defined as the 3-mile viewshed to the south and Badwater Road to the north). A portion of the TCP, as well as the western end of the Periphery extends into Fremont County (Lander Field Office planning area). This analysis is limited to a 21,742-acre area, 19,637 acres of which are BLM-administered lands within the planning area as discussed in this document.

4.7.1.16 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- All surface-disturbing activities are intensively managed in the Cedar Ridge TCP and Periphery under alternatives B and E. See Appendix I.
- New NSO or CSU restrictions can be applied only to new leases. Existing lease stipulations will continue as they are.
- Future development in the Cedar Ridge Periphery Area will require ROW for roads, pipelines, and possibly powerlines. Specific placement of these ancillary facilities will be guided by compliance with Section 106 of the NHPA, and planned to minimize visual intrusions. Restrictions on placing ROWs in the Periphery Area (as defined above) will be project-specific.
- The utility corridor crossing the southern edge of the Periphery Area will continue. New ROW in the corridor will comply with Section 106 requirements.
- Leases within the Cedar Ridge TCP and Periphery Area contain various stipulations concerning surface disturbance, surface occupancy, and limited surface use. In addition, the lease stipulations provide that the DOI may impose "such reasonable conditions, not inconsistent with the purposes for which [the] lease is issued, as the [BLM] may require to protect the surface of the leased lands and the environment." None of the stipulations, however, empower the Secretary of the Interior to deny all drilling activity because of environmental concerns.

4.7.1.17 Analysis of Alternatives

Impacts Common to All Alternatives

Impacts of the proposed Cedar Ridge TCP and Periphery Area vary by alternative, as described below. In general, land use authorizations can physically disrupt the archeological component with subsequent loss of valuable scientific data. Further, increased activity compromises traditional cultural values, such as

tranquility and isolation important to the Eastern Shoshone, and renders Cedar Ridge useless for those purposes. Increased development in the Periphery Area could further diminish the suitability of the area for ceremonial purposes. The various alternatives define how land use activities would be balanced against scientific and traditional values.

Alternative A

Cultural resources at the Cedar Ridge TCP under Alternative A are protected on a case-by-case basis. Where resources are not protected, impacts to those resources could occur as a result of mineral development and other surface-disturbing activities. Compliance with Section 106 of NHPA prevents direct impacts, but indirect impacts to nontangible values could occur. The area is open to oil and gas leasing with exploration and development subject to various restrictions to protect resources under Alternative A. Without a defined periphery and viewshed protection, indirect adverse impacts to the TCP could result from adjacent land use activities. Not establishing the area under special designation would result in the least restrictive management of other resources, the most potential development and use of the area, and the least potential for protecting the traditional cultural values compared to all other alternatives. The potential resource management actions within this area would still be subject to the 1985 VRM class management, which designates this area as Class II and IV. Although the current impact to the viewshed from livestock management is relatively low, any new rangeland improvements could cause degradation. The potential for increased recreation (including hunting) and OHV use in the area, impacting the cultural resources on the site, also exist.

Under current management, oil and gas exploration and development, as well as geophysical operations are subject to restrictions within the TCP and portions of the Periphery Area. Proposed well locations would be denied or relocated and geophysical projects modified based on consultation with tribes. The area is open to disposal of mineral materials and locatable minerals entry. Direct or indirect impacts to other resources are not expected.

Alternative B

Under Alternative B, the 21,742-acre Cedar Ridge TCP and Periphery Area is designated as an ACEC. Approximately 19,637 acres within the proposed ACEC are BLM-administered lands. This alternative provides the maximum beneficial impact to the Cedar Ridge TCP and Periphery Area among the alternatives with respect to protection of cultural resources. Restrictions are applied to resource development and use throughout the ACEC, including NSO restrictions within the TCP and CSU restrictions in the Periphery Area. Implementing these and other restrictive actions would afford considerable protection to resources for which the ACEC/SMA is proposed.

NSO and CSU restrictions within the area would have a direct adverse impact on the exploration and development of minerals, including oil and gas. The NSO restriction would prohibit mineral development within the TCP boundary and may require the use of other drilling techniques to recover the oil and gas resources. Under the proposed CSU restriction, exploration and development of any potential oil and gas reserves would have to be done, where feasible and appropriate, by means of well twinning or directional drilling methods. Directional drilling would increase costs significantly compared to the drilling of a vertical well. The oil and gas resource may not be recoverable, depending on the number and location of well pads allowed in the Periphery Area. Portions of the TCP and Periphery Area are nonfederal minerals over which BLM has no jurisdiction. Productive wells drilled on these nonfederal minerals could result in potential drainage of federal oil and gas resources.

While exploration and development is allowed in the Periphery Area, activities would be subject to a CSU stipulation restricting exploration and development unless a satisfactory mitigation plan is developed. Approximately 9,479 acres of oil and gas leases are held by production within the proposed

boundary. These leases, which are held until production ceases, would conflict with the proposed management of the ACEC. Surface-disturbing activities within the ACEC would be subject to a CSU restriction prohibiting or restricting exploration and development unless a satisfactory mitigation plan is developed.

Under Alternative B, the TCP and the Periphery Area are withdrawn from mineral entry. Numerous mining claims exist in the area. The withdrawal would be pursued to segregate the area from operation of the mining laws, which would preclude staking new claims. Existing claims represent valid existing rights and would not be affected by the withdrawal. A validity examination may be initiated to contest existing claims. If the validity examination finds the claims are not valid, the claims would be declared null and void, and the segregation from operation of the mining laws would take effect. No mining activity would occur. Claims determined to be valid would not be affected by the withdrawal, and mining activity could continue. If a valid claim was abandoned or invalidated for any reason, the withdrawal segregation would then take effect on the land, precluding any further mining activity.

Developing mineral materials also would be prohibited within the TCP and limited in the Periphery Area creating a minor adverse impact on that resource. Again, the impact would be minimal given the limited spatial extent of the proposed ACEC. Existing mineral material permits would be allowed to expire without renewal or expansion.

The NSO and CSU restrictions also limit range improvements on the property to maintenance of existing developments only, causing limited adverse impact to rangeland resources. This adverse impact would be enhanced by management actions aimed at maintaining or reducing the current level of livestock use.

Protective measures prohibiting surface disturbance (i.e., NSO restrictions and mineral withdrawal) on the TCP and required mitigation for disturbance in the Periphery Area are expected to minimize the spread of INPS, limit biological impacts, and increase the potential for meeting VRM goals compared to Alternative A. The potential resource management actions within this area would be subject to maintaining the ceremonial values, which generally coincide with VRM class management. Current VRM inventory designates this area as Classes II and III.

An ACEC designation may limit or prevent potential land disposal proposals associated with this area, resulting in a minor, long-term adverse impact. Because land use authorizations are prohibited under Alternative B, they would be impacted by the ACEC designation for the Cedar Ridge TCP.

Alternative C

Under Alternative C, the Cedar Ridge TCP is established as an SMA on 19,095 acres, of which 12,481 are BLM-administered surface and 16,994 are federal mineral estate. The Periphery Area under Alternative C is bounded on the south by the Arminto/Lost Cabin Road and Badwater Road to the north. Alternative C would have the same beneficial impact to visual resources, the same adverse impacts to rangeland resources, and the same impacts to lands and realty (i.e., land disposal) as under Alternative B, but to a slightly smaller degree given the smaller spatial extent of the SMA.

Adverse impacts to mineral resources under Alternative C are similar to those described under Alternative B, with the following exception: the CSU restrictions would apply to a smaller area given that the Periphery Area in Alternative C is smaller than in Alternative B; a mineral withdrawal would be pursued only for the TCP but not the Periphery under Alternative C, limiting impacts to locatable minerals. These area reductions would be negligible with regard to overall impacts to mineral resources.

Alternative D

Alternative D does not implement a special designation for the Cedar Ridge TCP. Alternative D provides a minor beneficial impact to the TCP by adding CSU restrictions within the TCP itself, compared to Alternative A. Adverse impacts to the cultural resources for which the area is proposed are similar to those under Alternative A. Adverse impacts to mineral resources as a result of the CSU restrictions would be minimal, unless an acceptable plan for mitigating impacts is not reached, restricting or prohibiting oil and gas development. No withdrawal from locatable mineral entry would be pursued and developing mineral materials would be allowed. Impacts to other resources are not expected.

Alternative E (Preferred Alternative)

Under Alternative E, the Cedar Ridge TCP is not designated as an ACEC or an SMA; however, additional management actions are established to protect sensitive and significant cultural values known to exist in the area. An NSO restriction would be applied within the TCP and a CSU restriction would be applied to the Periphery Area (from as far south as the Arminto/Lost Cabin Road and as far north as the Badwater Road), resulting in the same impacts to mineral resources and rangeland resources as described under Alternative C. The TCP only is withdrawn from mineral entry and mineral materials development is prohibited. The Periphery Area would be available for locatable mineral entry and mineral materials development. These actions would adversely impact locatable and salable minerals, as described under Alternative C.

4.7.1.18 Conclusion

Alternatives B and C serve to protect the resources for which the Cedar Ridge TCP ACEC/SMA was proposed more than the other alternatives. Conversely, alternatives B and C could have the most adverse impacts on other resources, specifically minerals and rangeland resources. Alternative A provides the least protection for cultural resources in the Cedar Ridge TCP area and the least potential adverse impacts to other resources. Under Alternative E, the Cedar Ridge TCP would not be designated as an ACEC, nor established as an SMA. However, specific management actions would protect important cultural values with the least practical impact on other resources. NSO would be allowed within the TCP. Maintenance of existing range improvements would be allowed, but no new improvements. The Periphery Area would extend only as far south as the Arminto-Lost Cabin Road. A CSU restriction would be applied to this area and use of directional drilling or well twinning would be encouraged. Developing mineral materials would not be permitted within the TCP, existing mineral material permits would be allowed to expire without renewal or expansion, and disturbed areas would be reclaimed. Mineral materials development within the Periphery Area would be limited to 5 acres or less, allowing for expansion of sites only after rehabilitation of the initial location. The BLM will pursue acquisition or interest in lands in the Cedar Ridge TCP area. Livestock would be managed to meet the objectives of the TCP. A withdrawal of 4,058 acres of mineral estate is pursued within the TCP, segregating from operation of public land laws, including the mining laws.

Overall, the potential for mineral resources (leaseable, locatable, salable) in the Cedar Ridge TCP is modest at best. Of 3,372 acres of public land and 4,082 acres of federal minerals, the area has 3,501 acres of moderate oil and gas potential and 581 acres of low oil and gas potential. CBNG potential is very low. The area contains 2,492 acres of poor to marginal wind-energy potential, 1,451 acres of fair potential, and 132 acres of good potential. Locatable and salable minerals (uranium, base metals, bentonite, gypsum, limestone) are all rated at zero acres of high-moderate potential, and 4,082 acres of low to no potential. Applying constraints such as NSO to this area will affect about one-third of acres held by production (Hitchcock Draw and Madden Units), and have little adverse impact on locatable or salable minerals, and moderate adverse impact to oil and gas. Considering the rugged terrain within the TCP, suitable drilling locations are rare, and interest will be more readily placed on the Periphery Area. Here the landscape is

more suitable to construction of well pads and other ancillary facilities. Constrained only by CSU restrictions, development on 18,591 acres (Alternative B) or 15,948 acres (alternatives C, E) will be conditioned by topography and cultural issues, but not precluded. Withdrawing the TCP from mineral entry will have negligible effect on locatable minerals, but a locatable minerals withdrawal in the Periphery Area (Alternative B 19,637 acres; alternatives C and E, 4,058 acres) would be more substantial. For the most part, other resources or uses would be minimally affected, as limiting surface disturbance would enhance vegetation, soils, air quality, and wildlife. Range improvements would be limited to maintenance of existing facilities and grazing management would need to meet cultural resources management goals. Recreation is unlikely to experience substantial adverse impacts.

North Platte River ACEC (Proposed)

Designation of the North Platte River ACEC provides protection of the natural resources, wildlife habitats, and future recreational opportunities within the corridor of the North Platte River. The alternatives are similar, varying primarily in size and management intensity.

The North Platte River ACEC size and location varies by alternative, the largest of which encompasses public lands within ¼ mile on either side of the river from the high watermark for the entire length of the North Platte River within the planning area. Impacts of the ACEC are limited to the lands falling within the boundaries defined for each alternative.

4.7.1.19 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The existing SRMA designation for the North Platte River is carried forward for alternatives A, D, and E. The BLM is preparing an EA and a Recreation Area Management Plan for the SRMA.

4.7.1.20 Analysis of Alternatives

Impacts Common to All Alternatives

The North Platte River protective withdrawal, comprising 3,226 acres, is continued under all alternatives. Lands acquired by purchase or donation are segregated from operation of the public land laws, including the mining laws, and restoration projects focus on improving wildlife habitats and recreational opportunities.

Establishment of a North Platte River ACEC (SRMA for alternatives A, D, and E) under all alternatives would establish the North Platte River as a priority area and, as such, management efforts would focus such that problems and issues can be dealt with more effectively, thereby serving to better protect cultural resources, visual resources, and wildlife and riparian habitats. A slight adverse impact to cultural resources may occur in that if disturbance is lessened, the need for a cultural resource survey may be less, and less cultural information would be generated. Overall, however, the ACEC would benefit cultural resources.

Alternative A

Under Alternative A, the SRMA continues on the Trappers Route landing sites between Alcova and Casper and 10 riverfront parcels of public surface between Casper and the Wyoming – Nebraska border. The SRMA has direct beneficial impacts to recreation opportunities. Developing new facilities, designating and upgrading roads, and reclaiming heavily impacted areas provides a range of river-related activities and user experiences. Developing recreational facilities mitigates environmental impacts related to recreational use.

Travel routes are limited to designated roads and trails. All roads existing prior to 1985 are available for use, and access roads are upgraded. Current travel management along the river provides for current levels of recreational use, with increased access possibilities in the future. All newly acquired lands are managed in accordance with the SRMA objectives.

Apart from recreational infrastructure, management actions limit surface development and exclude mineral material sales within ¼ mile of the North Platte River. New ROWs are excluded within 1 mile of the North Platte River. Current management allows for changes to grazing leases as deemed necessary and acquired lands closed to grazing. These actions have numerous benefits, such as minimizing the spread of INPS, reducing erosion and the associated sediment levels, and protecting the visual resources within the corridor. These management actions also benefit natural habitats, the integrity of NHTs and Other Historic Trails, and the quality of recreational experiences.

The ¼-mile surface-development restriction allows directional drilling to recover oil and gas reserves within the buffer. The 1-mile ROW restriction prevents only the building of new access roads on public surface within the corridor. Therefore, these actions do not have a major impact on oil and gas drilling and production and geophysical exploration. Prohibiting sand and gravel extraction on public lands between Alcova and the Wyoming – Nebraska border, removes approximately 15,000 acres of federal mineral estate and is considered a major adverse impact.

Management prescriptions within this area, including developing infrastructure, are subject to the 1985 VRM, which designates this area as Class III. Alternative A results in the least restrictive management of visual resources. Restrictions on surface development would limit impacts to visual resources.

Alternative B

Alternative B designates as an ACEC all public surface and federal mineral estate within ¼-mile of the high watermark on both sides of the river (3,488 acres of BLM-administered surface) throughout the entire length of the planning area. This is essentially the same area currently being intensively managed for recreation and wildlife habitats. Active management of recreation resources has similar impacts to those described under Alternative A, but to an inherently greater extent. OHV use is restricted to designated routes, as outlined in the North Platte River Recreation Area Management Plan.

The ACEC is closed to all mineral activities, including geophysical exploration, and is a ROW avoidance area. The area is not available for livestock grazing. These management actions provide additional protection to the North Platte River and have fewer impacts on soil and water resources than Alternative A. Designation of the North Platte River as an ACEC results in the most restrictions and adverse impacts to nonrenewable resources. However, the impacts of Alternative B are only slightly elevated compared to existing management. Limited leasing results in some long-term adverse impacts to oil and gas development. Impacts to sand and gravel operations are identical to those described in Alternative A.

Conservation measures under Alternative B are slightly more restrictive than those under Alternative A and would provide more benefits to riparian and wetland areas. Eliminating livestock grazing on Trappers Route landing sites and acquired lands along the river enhances vegetative communities, improves bank stability, and encourages willow and cottonwood regrowth. Restoration of cottonwood stands is expected to result in long-term beneficial impacts on riparian communities and increase available perches for bald eagles and other raptors. Impacts to the local grazing community are not expected to be substantial.

Alternative C

Alternative C designates lands within ¼ mile from the high watermark on both sides of the river between Pathfinder Dam and the Dave Johnston Power Plant as an ACEC (2,387 acres of BLM-administered surface). The majority of public land parcels along the North Platte River lie within this area.

Public lands and minerals within the ACEC boundary are managed as described in Alternative B, with the exception that acquired lands are available to livestock grazing, excluding riparian zones. Within the boundaries of the ACEC, benefits to wildlife habitats, visual resources, historic trails, and recreation opportunities are expected to be similar to those described in Alternative B, but to a slightly diminished degree given the smaller spatial extent of the ACEC.

Public lands east of the Dave Johnston Power Plant and contiguous to the river are available for mineral development subject to CSU restrictions. Mineral use in these areas could occur under Alternative C, creating a beneficial impact for those resources.

Alternative D

Under Alternative D, the Trappers Route landing sites and public lands within ¼ mile on either side of the river from the high watermark between Pathfinder Dam and Robertson Road in Casper (2,238 acres of BLM-administered surface) are managed as an SRMA. Public lands within the SRMA boundary are managed for intensive recreation, and open to oil and gas leasing subject to an NSO restriction. Acquired lands are available for livestock grazing. Within these boundaries, benefits and impacts to all resource values, including mineral development, are similar to those under Alternative A but to a lesser degree, given the smaller spatial extent of the SRMA.

East of Casper, lands within a ¼ mile of the river are made available for mineral development, sand and gravel operations, and free-use areas, subject to CSU restrictions. Public lands adjacent to Guernsey and Glendo reservoirs, however, are made available for disposal of mineral materials. All lands currently leased for grazing continue and no impacts are anticipated. The lessening of restrictions on this portion of the river benefit both leasable and salable mineral development, compared to all other alternatives.

Alternative E (Preferred Alternative)

Under Alternative E, the area is managed as an SRMA, but expanded to include the Trappers Route landing sites and public land parcels within ¼ mile on either side of the river from the high watermark between Pathfinder Dam and the Natrona/Converse county line (2,250 acres of BLM-administered surface). The corridor is open to oil and gas leasing, subject to NSO restrictions. Recreational landing sites and lands acquired along the entire river to enhance public access are closed to livestock grazing. Impacts are similar to those discussed under Alternative A for the SRMA.

Public lands within ¼-mile of the river segment and east of the Natrona/Converse county line are open to oil and gas leasing and development and mineral materials disposal on a case-by-case basis. All surface-disturbing activities on public lands in this section would be subject to CSU restrictions. Public lands adjacent to major reservoirs, including Glendo and Guernsey, are not available for mineral materials disposal and are subject to an NSO restriction. These restrictions have limited adverse impacts on mineral resources. This restriction does not include recreation facilities.

Impacts to renewable resource values resulting from this alternative are not substantially different than those described in Alternative C. Impacts to nonrenewable resources are similar to Alternative D.

4.7.1.21 Conclusion

Alternative B provides the greatest protection to natural resources, wildlife habitats, and future recreational opportunities within the corridor of the North Platte River, but has the most adverse impacts to mineral resources. Alternatives A, C, D, and E have varying levels of restrictions, primarily based on adjusted ACEC/SRMA boundaries, but still afford protection for the river ecosystem, recreation, wildlife, cultural, and visual resources.

Salt Creek SMA (Proposed)

The Salt Creek SMA facilitates oil and gas exploration and development in the Salt Creek oil field area. The BLM issues all new oil and gas leases in this area with standard stipulations only (Appendix N) and development complies with nondiscretionary laws (e.g., ESA, NHPA). However, the BLM would not consider discretionary timing stipulations such as those imposed for the protection of greater sage-grouse, raptor, and mountain plover nesting habitats and big game crucial winter ranges.

The proposed Salt Creek SMA falls completely within the existing Salt Creek Hazardous Area ACEC boundary in northeastern Natrona County. Impacts to resources are limited to the area within the SMA boundary.

4.7.1.22 Methods and Assumptions

Methods and assumptions used in this impact analysis are identified at the beginning of Chapter 4.

4.7.1.23 Analysis of Alternatives

Impacts Common to All Alternatives

Impacts of the proposed Salt Creek SMA vary by alternative, as described below.

Alternative A

Under Alternative A, no special management is prescribed for the Salt Creek SMA. The BLM manages oil and gas development in this area under current directives, including those prescriptions designated under the Salt Creek Hazardous Area ACEC.

Alternative B

Under Alternative B, the BLM would not establish the Salt Creek SMA, but manage the area in accordance with the RMP revision decisions for that resource or use. Therefore, there would be no impact to other resource uses from special designations under Alternative B.

Alternative C

Alternative C designates a 23,911-acre Salt Creek SMA, including 19,325 acres of BLM-administered surface, 22,228 acres of BLM-administered mineral estate, and a high oil and gas development potential as defined in the RFD (BLM 2005f). The BLM directs management actions at facilitating oil and gas exploration and development in the Salt Creek oil field, which is beneficial for oil and gas resources. Given the historic use of the area for extensive oil and gas exploration and development, the impacts to other resources are the same as Alternative A, with the exception of wildlife (e.g., greater sage-grouse, mountain plover, and raptors and big game) protected by discretionary laws. Management does not impose timing restrictions to protect these species and their habitats from oil and gas development in the proposed SMA. The SMA does not impact greater sage-grouse or big game crucial winter range because there are no known greater sage-grouse leks, greater sage-grouse nesting habitats, or crucial winter range habitats within the proposed SMA area. The area contains 10 raptor nests on BLM-administered surface and mineral estate (BLM 2005a), but the extent of mountain plover nesting habitats is unknown.

Establishing the Salt Creek SMA has limited impacts on cultural resources because the SMA requires adherence to nondiscretionary policies and restrictions. Historic preservation mandated by law in compliance with Section 106 of the NHPA would still be required. Cultural resources could experience secondary adverse impacts if other resource values (such as soils and vegetation) are de-emphasized.

Alternative D

The BLM establishes a much larger SMA under this alternative (90,931 acres) and includes Salt Creek, South Salt Creek, West Salt Creek, Smoky Gap, East Teapot, North Sage Spring Creek, and Sage Spring Creek fields. Under this alternative, the proposed SMA area includes 35,616 acres of BLM-administered surface and 79,420 acres of BLM-administered mineral estate. Based on the RFD (BLM 2005f), the area contains 23,872 acres of high oil and gas development potential and 67,059 acres of low oil and gas development potential. The impacts to other resources are the same as Alternative A with the exception of wildlife species protected by discretionary laws. Management does not impose timing restrictions to protect these species from oil and gas development. The area comprises 432 acres of crucial big game winter range, of which 23 acres are on BLM-administered surface and 357 acres are on BLM-administered mineral estate; 3 greater sage-grouse leks, of which 1 is on BLM-administered surface and 3 are on BLM-administered mineral estate; approximately 9,160 acres of greater sage-grouse nesting habitats; and 28 known raptor nests, of which 10 are on BLM-administered surface and 26 are on BLM-administered mineral estate. The amount of mountain plover nesting habitat is unknown. The sage-grouse-leks and most of the nesting habitat is located in the southern portion of the proposed SMA

Alternative E (Preferred Alternative)

Establishing the Salt Creek SMA under Alternative E has the same impacts on the management of other resources as described under Alternative C.

4.7.1.24 Conclusion

The Salt Creek SMA facilitates oil and gas exploration in the Salt Creek oil field areas. Establishing the SMA under alternatives C, D, and E could benefit oil and gas development activities with Alternative D having the greatest potential benefit due to the larger size of the area proposed under that alternative. Conversely, Alternative D could have the greatest adverse impact to wildlife species subject to discretionary protection.

Sand Hills SMA (Proposed)

The Sand Hills SMA manages the public lands to protect the integrity of the soils and vegetation within this fragile area. The 17,633-acre Sand Hills area is about 10 miles northeast of Casper and extends into Converse County. This impacts analysis is limited to the area within the proposed SMA boundary.

4.7.1.25 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- All surface-disturbing activities are managed intensively in the Sand Hills under alternatives B, C and E (See Appendix U).
- To be effective on highly erodible soils, more extensive BMPs than those commonly used will be installed and aggressively maintained. The risk of BMP failure is greater on highly erodible soils.

4.7.1.26 Analysis of Alternatives

Impacts Common to All Alternatives

The Sand Hills and associated uses defined in all alternatives are subject to the historic trail limitations related to the Bozeman Trail. The limitation includes protecting trail features and limiting surface-disturbing activities within a ¼-mile protective zone from either side of the physical trail or to the visual horizon, whichever is closer.

Alternative A

Current management for the area emphasizes the protection of fragile watershed values. The Sand Hills is not managed under any special designation. The area is subject to various development activities and will remain open to oil and gas leasing, mining, and material extraction. Livestock grazing is maintained at current levels unless the application of the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998b) indicates change is required. Oil and gas development has occurred in the Sand Hills for many years. Depending on the intensity of future development, habitat fragmentation, loss of vegetation cover, a substantial increase in INPS spread and wind and water erosion could result given the fragile nature of the soils in the Sand Hills.

Semiprimitive and primitive recreation opportunities are limited in the area due to intermingled land patterns and lack of legal access. Acquiring access to the area is limited to cooperative landowner agreements, and only if there is sufficient public demand to warrant access agreements. Acquiring public access into the Sand Hills, if not strictly controlled, likely would result in substantial damage to this fragile system. Cross-country ROW placement could occur under certain circumstances, potentially resulting in an impact to the viewshed.

Alternative B

Under Alternative B, the Sand Hills SMA is established on approximately 17,633 acres of public lands. Ninety-five percent of the SMA contains soils with high wind-erosion potential. Proposed management actions for this area have a beneficial impact on soil resources. Management actions under this alternative minimize surface disturbance, protecting both vegetation and soils. Wildlife habitat and associated species directly benefit. Beneficial impacts to cultural resources also could occur under this alternative as a result of reducing surface development.

New oil and gas leases are not issued for those areas currently unleased. Unleased federal minerals are closed to geophysical exploration. Development constraints and management actions reduce surface disturbance and the opportunity for INPS spread compared to Alternative A.

Establishing the Sand Hills SMA likely would limit or prevent potential land disposal proposals associated with this area, unless directed at adjusting the boundary or acquisitions that compliment the SMA.

Motorized public access to the area is not pursued to protect fragile soils and vegetation from uncontrolled OHV use. Motorized access for ranching and oil and gas operations continue, but are limited to existing roads and trails. Acquiring nonmotorized legal access to the area further benefits recreation, but is restrictive in terms of class of users. Under Alternative B, exclusion of ROWs could impact future oil and gas developments.

Closure of the Sand Hills SMA to future oil and gas leasing and development has direct adverse impacts to oil and gas resources. Unleased lands within the SMA are subject to drainage from producing wells

completed on adjacent state and fee minerals. Portions of the proposed SMA are held by production and other areas within the SMA are leased. Unleased federal minerals within the SMA are not within any unitized area. Surface-disturbing activities on existing oil and gas leases are intensively managed to meet the objectives for management of the area. Ninety-eight percent of the SMA is identified as having low oil and gas development potential, so impacts on future development are expected to be minor. However, a multimillion-dollar 3-D geophysical project was recently completed in this area, which could lead to further development and leasing.

The proposed Sand Hills SMA also is withdrawn from locatable mineral entry under Alternative B and closed to mineral material development, reducing the availability of those resources. No new corridor designations are made in this alternative, and the area is a ROW avoidance area.

Alternative C

Under Alternative C, the Sand Hills SMA is established on approximately 17,633 acres of BLM-administered lands, which is the same area as Alternative B. Managing the Sand Hills SMA under Alternative C is the same as Alternative B, with the exception of obtaining motorized access to the area under Alternative C.

Alternative C allows for public road access to the area, which benefits recreational use; however, road access creates transport corridors for INPS spread and OHV use increases, resulting in increased erosion of soils in the area. Impacts to oil and gas and the disposal of mineral materials and locatable minerals are the same as Alternative B.

Alternative D

Under Alternative D, the Sand Hills SMA is not established. Management is in accordance with the RMP revision decisions for each resource or resource use. Impacts to resources and resource uses are expected to be similar to those identified under Alternative A. Cross-country ROWs could occur under certain circumstances.

Alternative E (Preferred Alternative)

Alternative E has the same impacts on the management of other resources as described under Alternative B.

4.7.1.27 Conclusion

Alternatives B and C are aimed at protecting the integrity of the soils and vegetation within the proposed SMA. Alternatives B, C, and E, could have beneficial impacts on these resources to varying degrees, with Alternative B being most beneficial. Alternatively, restrictions imposed by alternatives B, C, and E, especially on mineral resources, have adverse impacts on resource availability and development. Additional constraints proposed under this SMA cannot be applied to existing leases without consent of both the lessee and the BLM. However, surface-use mitigation measures can be developed through the EA process and applied as conditions of approval to any new development action. Since no new oil and gas leases are issued, unleased lands within the SMA are subject to drainage from producing wells completed on adjacent state and fee minerals.

South Bighorns/Red Wall ACEC/SMA (Proposed)

The South Bighorns/Red Wall special designations are proposed to protect and enhance crucial wildlife habitats, unique vegetative communities, and cultural, historical, recreational and visual quality. Management is directed toward maintaining habitats and preserving the diversity of resources in this area.

The South Bighorns/Red Wall area is located in the northwestern portion of Natrona County. The actual area encompassed by each alternative varies.

4.7.1.28 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Existing and future special designations within the boundary of the proposed South Bighorns/Red Wall ACEC or SMA are managed under the decisions for those areas.
- Impacts to existing special designations within the proposed South Bighorns/Red Wall ACEC or SMA are not addressed in this discussion, as they are expected to be minimal.
- All surface-disturbing activities in the South Bighorns/Red Wall ACEC or SMA under alternatives B, C, and E are intensively managed, as described in Appendix U.
- Impacts to locatable and saleable minerals are based on the acres of a given resource with moderate or greater potential for development.
- Due to the mixed land ownership, the area is managed in cooperation with adjacent landowners.
- Under normal circumstances, standard mitigation guidelines are effective in minimizing impacts to resources; however, conditions such as steep slopes, highly erosive soils, or extreme environmental events may require more aggressive management actions to mitigate adverse impacts.

4.7.1.29 Analysis of Alternatives

Impacts Common to All Alternatives

Grazing use is maintained as presently authorized. Allotment adjustments, if needed, are prescribed by applying the Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming (BLM 1998b). In general, grazing by large ungulates may adversely impact vegetation, soil, and water if not properly managed. Riparian and wetland communities can be adversely impacted, as livestock and wildlife tend to congregate in these areas. Competition for the same forage occurs between livestock and wildlife. Impacts to other resources vary by alternatives, as described below.

Alternative A

Currently, no special designations exist for the area. The area is managed for multiple-use with an emphasis on wildlife habitats, cultural resources, grazing, and recreational use. Resource values found in the area are managed in accordance with existing RMP decisions for those resources and managed per the prescriptions defined for resource management unit (RMU) 1. For analysis purposes, the area proposed for designation under Alternative C was used, since it encompassed the greatest area.

Three natural landmarks currently occur within the proposed area: the Badwater/Grey Hills Natural Landmark, the Rainbow Hills of Arminto Natural Landmark, and Precambrian Gneiss of the Big Horns Natural Landmark. The area also is bisected by the South Bighorns/Red Wall National Back Country Byway. This portion of the planning area contains part of the Middle Fork Powder River SRMA.

Management restrictions designed to protect resources include no occupancy on slopes exceeding 25 percent and no surface development within a ½ mile of the Red Wall/Gray Wall complex. Various timing limitations and wildlife restrictions apply from October 1 to June 15. Management prescriptions include monitoring wildlife, habitat-improvement projects, and forest stand improvement. The area is open to operation of the public land laws and mineral material sales. Necessary ROWs are confined to county

roads, but placement along the Big Horn Mountain, Okie Trail and Buffalo Creek roads is excluded. OHV use is limited to existing roads and trails. Approximately 20,179 acres, of which 12,539 acres is public surface and 20,179 acres are federal mineral estate, continue to be closed to oil and gas leasing. The area continues to be open to geophysical exploration with operations limited by NSO restrictions.

The impact resulting from the restrictions relative to oil and gas leasing continue. Salable and locatable mineral resources are available for use. Specific VRM mitigation standards have not been identified. Scenic quality evaluations or class determinations for the area were not completed, resulting in the least restrictive management of visual resources. Cultural resource inventories prior to authorized activities continue to comply with Section 106 of the NHPA.

Alternative B

Under Alternative B, the South Bighorns/Red Wall ACEC is designated on 262,901 acres, of which 146,812 acres are public surface and 216,460 acres are federal mineral estate. Under Alternative B, designation as an ACEC emphasizes management for renewable resource values, but allows for limited development of existing mineral material and oil and gas rights.

Restrictions include withdrawal from the mining laws, closure to oil and gas leasing and geophysical operations on public surface, closure for mineral material development, and an NSO restriction for ½ mile on either side of the Red Wall/Gray Wall complex. A CSU restriction applies to all nonmineral-related surface-disturbing activities. The proposed area is a ROW exclusion area. These requirements protect the integrity of the ecosystem within the boundary of the ACEC.

Under Alternative B, valid existing rights are honored. Due to the closure of geophysical operations, it is harder to identify oil and gas reserves. The closures to oil and gas leasing and geophysical operations adversely impacts these resources and results in an economic loss. This impact is expected to be minor, since 97 percent of the area has low to no potential for oil and gas development. Activities on existing oil and gas leases are intensively managed to meet the goals of the ACEC (see Appendix U), which may increase the operational costs of oil and gas development. To minimize surface-disturbing activities, oil and gas exploration and development use directional drilling techniques and well twinning when ever practicable. Since the area is closed to disposal of mineral materials, the existing pits in the area are closed when the permits expire. Thus, the resource is not developed. Any gravel needs have to be transported from sources outside the area. No impacts to uranium, trona, or other base and precious metal development occur since these resources have no acres with moderate or greater potential for development. Some adverse impacts to the development of bentonite, gypsum, limestone, and phosphate occur.

The more restrictive management of resources under this alternative provide a greater potential for achieving VRM goals compared to Alternative A. The proposed management and changes in Alternative B provide greater opportunity to manage OHV use than does Alternative A.

Designating the South Bighorns ACEC has a beneficial impact on cultural resources because surface-disturbing activities are more restricted and systematic block cultural inventories are conducted. In addition, lands are acquired to block and buffer sensitive cultural resources, such as concentrations of sites eligible for nomination to the NRHP.

Alternative C

Under Alternative C, the South Bighorns/Red Wall SMA is established on 369,325 acres of which 206,155 acres are public surface and 309,854 acres are federal mineral estate. Management of this area

focuses on renewable resources, such as wildlife and recreational values, but also allows for limited development of existing mineral material and oil and gas rights.

The SMA is withdrawn from the mining laws and closed to new oil and gas leasing and geophysical operations. That portion of the viewshed of the South Bighorns/Red Wall National Back Country Byway and other county roads within the SMA restrict surface disturbance associated with mineral material development to 5 acres or less, allowing for expansion of sites or contiguous disturbance only after rehabilitation of the initial location has been initiated. A CSU restriction is applied to the Red Wall/Gray Wall complex. The existing Lost Cabin-Arminto Road designated ROW corridor is to continue, but no new ROW corridors are designated. The remainder of the proposed area is a ROW exclusion area.

Closure to oil and gas leasing and geophysical operations has the same impact as described in Alternative B because more than 99 percent of the area has low to no potential for oil and gas development. Activities on existing oil and gas leases are intensively managed to meet the goals of the SMA (see Appendix I), which may increase the operational costs of oil and gas development. To minimize surface-disturbing activities, oil and gas exploration and development use directional drilling techniques and well twinning whenever practicable. Five-acre development of mineral materials meet local needs and allows for expansion of operations resulting in negligible impacts to mineral material development. No impacts to uranium, trona, or other base and precious metal development occur since these resources have no acres with moderate or greater potential for development. More adverse impacts occur to the development of bentonite, gypsum, and phosphate, but less adverse impacts to the development of limestone than Alternative B.

Establishing the South Bighorns/Red Wall SMA has less beneficial impacts on cultural resources than Alternative B because surface-disturbing activities are less restricted and block cultural inventories are conducted in high site density areas only rather than the entire area. Land acquisition to benefit cultural resources is the same as Alternative B.

Alternative D

Under Alternative D, the South Bighorns/Red Wall area is not designated as an ACEC or SMA. Management is in accordance with the RMP decisions for individual resources or resource uses.

Under Alternative D, ROWs in the area are evaluated on a case-by-case basis. Since standard stipulations are the only restrictions applied, Alternative D results in a beneficial impact to oil and gas leasing or development, geophysical operations, mineral material development, or development of locatable minerals. These resources are limited by the potential for any given resource in the area.

Management of and impacts to cultural resources are the same as Alternative A.

Alternative E (Preferred Alternative)

Under Alternative E, 93,352 acres are established as an SMA, of which 55,945 acres are public surface and 75,913 acres are federal mineral estate. Under Alternative E, establishing an SMA emphasizes management for renewable resource values, but allows for limited development of existing mineral material and oil and gas rights.

Restrictions to be applied to all activities include withdrawal from the mining laws, closure to oil and gas leasing and geophysical operations on public surface, closure for mineral material development, and an NSO restriction for ½ mile on either side of the Red Wall/Gray Wall complex. All activities within the area outside the ½ mile on either side of the Red Wall/Gray Wall complex are restricted by a CSU

restriction. The area is a ROW exclusion area. These requirements protect the integrity of the ecosystem within the boundary of the SMA.

Under Alternative E, valid existing rights are honored. Due to the closure of geophysical operations, it is harder to identify oil and gas reserves. The closures to oil and gas leasing and geophysical operations adversely impacts these resources and results in an economic loss. This impact is expected to be minor since 100 percent of the area has low to no potential for oil and gas development. Activities on existing oil and gas leases are intensively managed to meet the goals of the ACEC (see Appendix U), which may increase the operational costs of oil and gas development. To minimize surface-disturbing activities, oil and gas exploration and development use directional drilling techniques and well twinning when ever practicable. Since the area is closed to disposal of mineral materials, the existing pits in the area are closed when the permits expire. Thus, the resource is not developed. Any gravel needs have to be transported from sources outside the area. No impacts to uranium, trona, limestone, or other base and precious metal development would occur since these resources have no acres with moderate or greater potential for development under Alternative E. Adverse impacts to the development of gypsum and phosphate would occur, but less adverse impacts than alternatives B and C.

Management of and impacts to cultural resources are the same as Alternative A.

4.7.1.30 Conclusion

The South Bighorns/Red Wall ACEC/SMA under alternatives B, C, and E could have long-term beneficial impacts to wildlife, soil, vegetation, and water resources by limiting surface and wildlife-disturbing activities in the area and managing the area intensively for these resources. Under alternatives A and D, the SMA is not established and the added potential beneficial impacts to the listed resources not realized.

Alternatives B, C, and E could have a greater impact to resource development activities, including minerals exploration and development, by restricting surface activities to a much greater extent than under alternatives A and D. The severity of the impact is directly related to area size.

Alternatives B and C, in that order, have the greatest beneficial impact to cultural resources due to increased inventories and priority for land acquisitions to protect cultural resources.

Wind River Basin SMA (Proposed)

The Wind River Basin SMA facilitates oil and gas exploration and development in the Wind River Basin. The BLM issues oil and gas leases in this area with standard stipulations (Appendix N) only, and development complies with nondiscretionary laws (e.g., ESA, NHPA). Under alternatives C, D, and E, the Casper Field Office does not apply big game crucial winter habitat, raptor nesting habitat, mountain plover, and greater sage-grouse nesting TLS restrictions within the Wind River SMA-established area. A ¼-mile CSU restriction protects greater sage-grouse leks.

TLS restrictions do not prevent eventual loss of habitats, but prevent wildlife-disruptive activities for one season, including habitat loss during crucial times, such as breeding/nesting or winter conditions. The timing limitation delays development during these time periods. These TLS restrictions do not apply to development of nonfederal minerals.

The proposed Wind River Basin SMA lies in the western portion of Natrona County. The Wind River Basin geologic province extends beyond Natrona County. Analysis of impacts is limited to the portion of the province located in Natrona County.

4.7.1.31 Methods and Assumptions

Methods and assumptions used in this impact analysis are identified at the beginning of Chapter 4.

4.7.1.32 Analysis of Alternatives

Impacts Common to All Alternatives

The RFD identified areas with high, moderate, and low conventional oil and gas development potential within the SMA. The chart below shows the number of conventional wells predicted for each of the development potential areas.

Conventional Wells

	High Development Potential	Moderate Development Potential	Low Development Potential
Wells per Township	100 – 500	20 – 100	2 – 20

The RFD also identifies areas within the SMA that have low to very low CBNG development potential. The RFD predicted 2 to 20 new wells per township in low development potential areas and less than one new well per township in areas with very low development potential. Some level of oil and gas development occurs under each alternative, resulting in loss of nesting and crucial winter range habitats. Impacts vary among alternatives, as described below.

Alternative A

Under Alternative A, the BLM manages oil and gas development under current management directives. Throughout the planning area, current management directives prohibit drilling and other surface-disturbing activities from November 15 to April 30 in big game crucial winter ranges. Three restrictions currently protect greater sage-grouse. Management directives prohibit surface-disturbing activities in greater sage-grouse nesting/early brood-rearing habitats from March 15 to July 15 within a 2-mile radius; prohibit surface disturbing activities in greater sage-grouse winter habitats from November 15 to March 14; and prohibit surface-disturbing activities or occupancy within ¼-mile of the perimeter of greater sage-grouse leks. Management directives also prohibit surface-disturbing activities or drilling from February 1 to July 31 within a ¼- to ½-mile buffer around raptor nests and from April 10 to July 10 in mountain plover nesting habitat areas.

Under Alternative A, the Wind River Basin geologic province area contains 292 raptor nests, 240 of these nests fall on federal mineral estate. Under current management, portions of the Wind River Basin, including Cooper Reservoir, Waltman, and Cave Gulch fields, provide the following protection measures for raptors. Development activity initiated prior to February 1 may be completely finished as long as the development activity does not cease for 3 weeks or longer between February 1 and June 1. A certified biologist checks nest activity if development ceases for 3 weeks or longer during the raptor breeding and nesting season. If an occupied nest is present, activity is restricted during the critical period, which is usually February 1 to July 31 for golden eagles and March 15 to July 31 for other raptor species, or until chicks are fledged.

Under this alternative, oil and gas development in the Wind River Basin continues to be restricted in many areas. Some areas are restricted to a 3-month development window in which TLS restrictions for crucial winter range overlap with timing restrictions for greater sage-grouse, mountain plover, and (or) raptor nesting habitats. As a result, drilling and associated development becomes intensified because of the short timeframe and the amount of area disturbed at once by road, pipeline, and well pad construction. The same TLS restrictions confine reclamation activities so large areas of surface disturbance may not receive any reclamation activities for periods in excess of 1 year. In areas with highly erosive soils,

temporary reclamation measures can be required, but only the fall window from September 15 to November 15 is open for seeding activity. As a result, TLS restrictions can adversely impact other resources such as air quality, water quality, INPS management, soils, and vegetation.

TLS restrictions do not prevent eventual loss of habitats. Tables 4-16 and 4-17 identify acres of greater sage-grouse breeding and nesting habitats and big game crucial winter habitats that could be impacted by this alternative.

Alternative B

This alternative establishes the Wind River SMA. The BLM manages surface development in accordance with the prescriptions identified under Alternative B, which include TLS restrictions and surface-use requirements. Alternative B proposes a 4-mile NSO restriction buffer around greater sage-grouse leks, impacting 311,182 acres of federal mineral estate in the Wind River Basin geologic province. The BLM already has leased 248,635 acres (80%) in this area without an NSO restriction. The remaining 20 percent of the area is located within no potential or low to very low development potential. The BLM could not deny drilling on existing leases that do not contain an NSO restriction resulting in a direct conflict with the management of these areas.

Alternative C

Under Alternative C, the Wind River Basin SMA is established on portions of the Wind River Basin that have been determined to have a moderate to high potential for oil and gas development (281,037 acres, of which 100,401 acres are BLM-administered surface and 233,496 acres are BLM-administered minerals). The area contains 16,198 acres of highly erosive soils, of which 5,943 acres are on BLM administered surface and 14,076 acres are on BLM administered mineral estate. The area also contains 11,509 acres that are in a Class II VRM area (see Glossary).

The established SMA area overlaps with the southern half of the proposed Cedar Ridge ACEC. The SMA still protects the TCP under this alternative, but there is a direct conflict with the management directives for oil and gas development in the buffer area that surrounds the TCP.

Under this alternative, the BLM does not apply discretionary TLS restrictions. Operators could spread out drilling and surface-disturbing activities throughout the year, rather than condensing the activities to a 3-month window as in Alternative A. There is less ground surface exposed at any given time, since reclamation would be ongoing throughout the year. As a result, there are beneficial impacts to other resources such as air quality, highly erosive soils, vegetation, INPS management, visual resources, and grazing as compared to Alternative A.

Refer to Table 4-16 for acres allocated to CSU or NSO restrictions surrounding leks and Table 4-17 for the acres of crucial winter range potentially impacted by this alternative. In the short term, Alternative C has a greater impact on the nine leks on BLM-administered minerals than Alternative A because use of the nesting habitats surrounding the leks could be lost during the nesting season, leading to abandonment of the leks. Similar short-term impacts occur to other wildlife species protected with TLS restrictions. Long-term impacts to wildlife are similar to Alternative A.

Table 4-16. Acres within the Wind River Special Management Area Established with CSU or NSO Restrictions for Greater Sage-Grouse Breeding and Nesting Habitats by Alternatives

Oil and Gas Development Potential	Federal Minerals (Acres)	Non-Federal Minerals (Acres)	Total (Acres)
Alternative A – 32 leks, of which 28 are on federal minerals ¼-mile CSU restriction plus 1¾-mile TLS restriction or 2-mile buffer			
High	212.70	0.00	212.70
Moderate	50,440.18	108.20	50,548.38
Low	77,816.59	5,419.58	83,236.17
Very Low	20,932.76	2,108.35	23,041.11
Total Acres	149,402.23	7,636.13	157,038.36
Alternative B – 32 leks, of which 28 are on federal minerals 4-mile NSO restriction buffer			
High	10,353.16	1,176.23	11,529.39
Moderate	85,725.76	16,803.85	102,529.61
Low	152,309.40	39,432.58	191,741.98
Very Low	55,871.59	10,610.88	66,482.47
None	6,921.92	1,855.77	8,777.69
Total Acres	311,181.83	69,879.31	381,061.14
Alternative C – 10 leks, of which 9 are on federal minerals ¼-mile NSO restriction plus 1 ¾-mile TLS restriction or 2-mile buffer			
High	212.70	0.00	212.70
Moderate	43,397.62	7,150.76	50,548.38
Low	0.00	0.00	0.00
Very Low	0.00	0.00	0.00
Total Acres	43,610.32	7,150.76	50,761.08
Alternative D – Same as Alternative A			
Alternative E (Preferred Alternative) – One lek, which is on federal minerals ¼-mile CSU restriction plus 1 ¾-mile TLS restriction or 2-mile buffer			
High	211.47	0.00	211.47
Moderate	2,552.31	315.06	2,867.37
Low	0.00	0.00	0.00
Very Low	0.00	0.00	0.00
Total Acres	2,763.78	315.06	3,078.84

NOTE: The oil and gas development potential presented is for conventional oil and gas only. The oil and gas development potential for coalbed natural gas ranges from low to very low or no potential.

Removing important big game crucial winter range stipulations in the Rattlesnake Hills area impacts big game, their winter survival, and ultimately their populations.

There are 173 raptor nests within Alternative C's boundary area, 149 of which are on federal mineral estate. Under this alternative, the entire SMA provides the same protection for raptors that is currently provided in Cooper Reservoir, Waltman, and Cave Gulch fields. Development activity initiated prior to February 1 may be completely finished as long as development activity does not cease for 3 weeks or longer between February 1 and June 1. A certified biologist checks nest activity if development ceases for 3 weeks or longer during the raptor breeding and nesting season. If an occupied nest is present, activity is restricted during the critical period, which is usually February 1 to July 31 for golden eagles and March 15 to July 31 for other raptor species, or until chicks are fledged.

Table 4-17. Acres of Crucial Winter Range within the Wind River Special Management Area by Alternative

Oil and Gas Development Potential	Federal Minerals (Acres)	Non-Federal Minerals (Acres)	Total (Acres)
Alternative A			
High	2,801.76	682.90	3,484.66
Low	22,143.38	3,848.33	25,991.71
Moderate	37,946.60	8,326.29	46,272.89
Very Low	69.26	24.48	93.74
Total Acres	62,961	12,882	75,843
Alternative B – Same as Alternative A			
Alternative C			
High	2,894.97	721.92	3,616.89
Low	0.00	0.00	0.00
Moderate	39,183.03	8,802.08	47,985.11
Very Low	0.00	0.00	0.00
Total Acres	42,078	9524	51,602
Alternative D – Same as Alternative A			
Alternative E (Preferred Alternative)			
High	2,738.89	740.45	3,479.34
Low	0.00	0.00	0.00
Moderate	119.36	0.00	119.36
Very Low	0.00	0.00	0.00
Total Acres	2,858.25	740.45	3,598.70

NOTE: The oil and gas development potential presented is for conventional oil and gas only. The oil and gas development potential for coalbed natural gas ranges from low to very low or no potential.

Alternative D

Alternative D establishes the Wind River Basin SMA on the entire Wind River Basin geological province within the planning area comprising 539,911 acres, of which 213,238 acres are BLM-administered surface and 446,615 acres are BLM-administered minerals. The area contains 80,617 acres of highly erosive soils, of which 44,881 acres are on BLM-administered surface and 71,941 acres are on BLM-administered minerals, as well as 13,068 acres that are in a Class II VRM area.

Impacts to the proposed Cedar Ridge ACEC are the same as Alternative C. Beneficial impacts to other resources such as highly erosive soils, water, vegetation, visual resources, and so on are similar to Alternative C, but occur over the entire extent of the Wind River Basin in the planning area.

Refer to Table 4-16 for the amount of acres allocated to CSU or NSO restrictions surrounding leks and Table 4-17 for the acres of crucial winter range potentially impacted under this alternative. Impacts to wildlife are similar to Alternative C except over a larger area.

In the short term, Alternative D has a greater impact on the 28 leks located on BLM-administered minerals than Alternative A because use of the nesting habitats surrounding the leks could be lost during the nesting season. Similar short-term impacts occur to other wildlife species protected by TLS restrictions. Long-term impacts to wildlife are similar to Alternative A.

Within Alternative D's boundary area there are 292 raptor nests, 240 of which fall on federal mineral estate. Under this alternative, protection for raptors is the same as Alternative C. Impacts are similar to Alternative C, but occur over a larger area.

Alternative E (Preferred Alternative)

The Wind River Basin SMA is established on portions of the Wind River Basin determined to have a moderate to high potential for oil and gas development—54,575 acres, of which 18,277 acres are BLM-administered surface and 44,302 acres are BLM-administered minerals. The area comprises 4,794 acres of highly erosive soils, of which 1,837 acres are on BLM-administered surface and 4,245 acres are on BLM-administered minerals but does not contain any Class II VRM areas (see Glossary). Beneficial impacts to other resources, such as highly erosive soils, water, and vegetation are similar to Alternative C, but occur over a small area.

Refer to Table 4-16 for acres allocated to CSU or NSO restrictions surrounding leks and Table 4-17 for acres of crucial winter range potentially impacted under this alternative. Under Alternative E, the BLM does not apply TLS restrictions, except on proposed activities for one active greater sage-grouse lek and its 2-mile nesting habitat. The known lek is located on BLM-administered surface and minerals in the far southeastern portion of the SMA boundary. In this area, a ¼-mile CSU restriction protects the lek and greater sage-grouse TLS restrictions apply. Seasonal protections of 3,079 acres of greater sage-grouse habitats occur under this alternative. Impacts to greater sage-grouse nesting habitats are the same as Alternative A.

The BLM does not apply big game crucial winter habitat restrictions under this alternative. Adverse impacts to big game crucial winter habitat under this alternative are slightly more than Alternative A because the area comprises 3,599 acres of crucial winter range.

Within Alternative E's boundary area, there are 92 raptor nests, 81 of which fall on federal mineral estate. Raptors are managed the same under this alternative as under Alternative C. Adverse impacts to raptors under this alternative are much less than alternative C or D due to the smaller aerial extent of the SMA.

4.7.1.33 Conclusion

The Wind River Basin SMA facilitates oil and gas exploration and development and associated reclamation activities. Establishing the SMA under alternatives C, D, and E could have beneficial impacts on oil and gas development and associated reclamation activities with Alternative D having the greatest potential beneficial impact due to the larger size of the area proposed under that alternative. Conversely, Alternative D could have the greatest adverse impact to wildlife protected by discretionary TLS restrictions.

4.7.2 National Back Country Byways

Actions occurring through implementing each alternative could impact National Back Country Byways. This section describes the impacts of each alternative on National Back Country Byways in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as beneficial or adverse.

National Back Country Byways are an important recreational resource on BLM-administered lands. These travel routes are used frequently and are susceptible to impacts over the long-term. Direct impacts to the byways include any action that substantially limits or prevents the use of the byways. Indirect impacts include actions that alter the use of the byways.

Two National Back Country Byways exist within the planning area: the Seminoe/Alcova National Back Country Byway and the South Bighorns/Red Wall National Back Country Byway.

4.7.2.1 Methods and Assumptions

Methods and assumptions used in this impact analysis are identified at the beginning of Chapter 4.

4.7.2.2 Analysis of Alternatives

Impacts Common to All Alternatives

Management of the two National Back Country Byways does not change substantially across alternatives and, therefore, all impacts are common to all alternatives.

The Seminoe/Alcova National Back Country Byway continues under the existing designation under all alternatives. Under all alternatives, interpretation and signage are concentrated along the travel route to enhance the public's understanding and appreciation of the area's natural history and current and historical uses of the surrounding lands. In addition, under Alternative B, kiosks are added. No substantial indirect impacts are anticipated.

The South Bighorns/Red Wall National Back Country Byway continues under the existing designation under all alternatives. Under all alternatives, interpretation and signage are concentrated along the travel route to enhance the public's understanding and appreciation of the area's natural history and current and historical uses of the surrounding lands. In addition, under Alternative B, kiosks are added. Inclusion of portions of the byway in the South Bighorns/Red Wall ACEC/SMA affords the byway some added protections. This benefit occurs with alternatives B and C. The geographic area evaluated for impacts is limited to only the National Back Country Byways.

4.7.2.3 Conclusion

Management actions described in this section for all alternatives were used to determine the potential impacts to National Back Country Byways. Both National Back Country Byways would continue with no substantial differences under all alternatives.

4.7.3 National Historic Trails and Other Historic Trails

Four NHTs and Other Historic Trails traverse the planning area (Oregon, California, Mormon Pioneer, and Pony Express). Trail ruts, settings, landmarks, and associated sites are a physical presence found throughout the planning area. Other historic trails, not congressionally designated, include the Bozeman and Bridger trails. Refer to Maps 64 through 66 for NHTs and Other Historic Trails.

NHTs and Other Historic Trails are fragile, nonrenewable evidence of recent human history and heritage on the landscape. They are public resources entrusted to the BLM for protection and interpretation, providing a context for present-day land use decisions. Moreover, NHTs and Other Historic Trails are a tangible link to our past, to one of the defining episodes of the American experience. Direct impacts to these resources typically result from actions that disturb the soil or alter characteristics of the surrounding environment that contribute to trail significance and introduce visual elements out of character with the property or that alter its setting, or result in neglect of the resource to the extent that it deteriorates or is destroyed. For example, surface-disturbing activities that impact trail ruts are considered an adverse direct impact because the trail segments are nonrenewable. Conversely, actions that result in data collection and preservation of NHTs and other historic trails can be considered beneficial impacts. Indirect impacts to NHTs and Other Historic Trails result from project-induced increases or decreases in activity in the planning area. The construction of a recreational facility may increase visitor use, which could result in indirect impacts to previously undisturbed trail segments. Recreation, in particular, is a

complex issue, as actions taken to preserve historic values can have both beneficial and adverse impacts for heritage tourism and trail enthusiasts.

For all agency undertakings that could adversely impact NHTs and Other Historic Trails, the BLM complies with Section 106 of the NHPA prior to conducting the undertaking. Section 106 compliance typically includes inventory, evaluation, and consultation with the SHPO.

4.7.3.1 Methods and Assumptions

Methods and assumptions used in this analysis include the following:

- Protection of NHTs and Other Historic Trails and related sites occur in accordance with federal laws and BLM regulations and agreements, regardless of whether the trails are specifically identified in the RMP.
- Direct and indirect impacts can result from a variety of natural and human-caused events, such as those that physically alter, damage, or destroy all or part of the trail; improve access, bringing increased use to an area, altering characteristics of the surrounding environment that contribute to the trail's importance; the introduction of visual or audible elements out of character with the trail or that alter its setting, and neglect of the trail to the extent that it deteriorates or is destroyed.
- The intensity of surface disturbance by alternative as identified in Appendix M equates to levels of development and, in turn, increased access to public lands.
- BLM looks favorably at opportunities to cooperate with private landowners to minimize or eliminate disturbance to NHTs and Other Historic Trails.
- Recognizing that historic trails often comprise numerous routes rather than a single trace, all protective zones begin at the outer edges of trails, rather than a centerline, which is difficult to define.
- Certain projects, due to size or topography, may require consideration of visual intrusions into the setting beyond the foreground or middle-ground zones to comply with Section 106 of the NHPA.

4.7.3.2 Analysis of Alternatives

Allowable uses and management actions that could impact NHTs and Other Historic Trails include changes in ownership, access, and proactive NHT and Other Historic Trails management actions. Any surface-disturbing activity, regardless of type, on or adjacent to NHTs and Other Historic Trails could cause adverse impacts to contributing segments of the trails.

Alternative A

Surface-disturbing Activities. Under Alternative A, surface-disturbing activities identified in Appendix M impact NHTs and Other Historic Trails. Under Alternative A, the projected short-term surface disturbance from BLM actions could result in the third-highest disturbance acreage, following alternatives E and D, respectively (refer to Table 4-1). The potential adverse impact to trails is somewhat limited, however, because compliance with Section 106 of the NHPA requires that some type of mitigation be applied to trail segments contributing to the overall importance prior to any disturbance. The relative amount of surface disturbance projected for each alternative defines the level of potential impact to NHTs and Other Historic Trails.

The impacts from surface-disturbing activities under Alternative A are anticipated to be commensurate with the intensity of RFAs shown in Appendix M. Moreover, the impacts to NHTs and Other Historic Trails from surface disturbance projected for Alternative A are anticipated to be primarily adverse.

However, normal compliance with Section 106 of the NHPA prior to the approval of an action serves to moderate the amount of actual disturbance. In those cases in which an accommodation cannot be made, consultation between the BLM and the SHPO takes place to develop and implement a treatment plan to mitigate adverse impacts to contributing segments. While this often results in project relocation, detailed recording and mapping or interpretation are some of the techniques used for mitigation, depending on the specific trail segment and the nature of the potential adverse impacts.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative A provide additional protection for trail resources. For example, under Alternative A for soils, surface-disturbing activities may be modified, timing restrictions implemented, or surface disturbance in selected areas prohibited. However, fewer restrictions on surface-disturbing activities are provided for under Alternative A as compared to alternatives B, C, and E; therefore, additional protection for NHTs and Other Historic Trails under Alternative A is less than all other alternatives, except Alternative D.

Land Disposal and Acquisition. Disposal of BLM-administered surface land can result in both beneficial and adverse impact to NHTs and Other Historic Trails. The results of the survey required under Section 106 of the NHPA, produce a beneficial impact to cultural resources because they generate data that furthers understanding of trail resources in the planning area. If contributing segments were identified during the inventory, it could result in an adverse impact because once in private ownership, there are no protective measures for cultural resources. However, land-tenure adjustment is classed as an adverse impact (in terms of Section 106) for that reason. Trail segments contributing to the overall NRHP eligibility would need to be mitigated by application of a treatment plan developed through consultation between the BLM and the SHPO. Acquiring lands within the planning area could result in a beneficial impact to cultural resources in that additional sites may be obtained in the newly acquired lands.

Access. General development (e.g., recreational facilities and mineral development) and OHV use can provide access to remote trail segments, possibly leading to adverse impacts related to traffic, vandalism, and erosion.

For the purpose of this analysis, development activities are anticipated to be similar in intensity to the surface disturbance acres identified in Table 4-1. Based on this assumption, it is anticipated that the third-highest amount of development and increase in access occurs under Alternative A and results in indirect adverse impacts. Since adverse impacts to important trail segments must be mitigated prior to authorizing an action, the degree of adverse impact is lessened.

Increased visitor use through OHV use and improved access can have both beneficial and adverse impacts on trail resources. For example, trail segments are protected when there are access restrictions, but may be exposed to vandalism or other impacts if multiple uses increase, including exploring for extractive resources (e.g., mining) or an increase in recreational opportunities. However, lack of access also can adversely impact the use of NHTs and Other Historic Trails for activities such as heritage tourism.

OHV use on public lands, under all alternatives, indirectly impact NHTs and Other Historic Trails. The impacts of OHV use are primarily anticipated to be adverse, indirect, and to occur in the areas limited to existing roads and trails for OHV use. Alternative A projects the largest area (1,311,715 acres) as limited to existing roads and trails for OHV use (Table 2-1). Although OHV use currently is restricted in some areas, and use is limited to existing and limited to designated roads and trails, new trails are continuously created and become part of the “existing designation.” The Oregon and Bozeman Trails are closed to OHV use.

Proactive NHT and Other Historic Trails Management Actions. Proactive management actions under Alternative A generally result in beneficial impacts to NHTs and Other Historic Trails. Under existing management, NSO is allowed within ¼ mile or the visual horizon (whichever is closer) of NHTs and Other Historic Trails. Since trails often comprise multiple traces, the ¼-mile zone extends from the outer edges of the overall trace.

NSO is allowed on Oregon Trail segments identified in Appendix W, and the BLM reassesses the need to include other segments as they may be identified and writes management plans for those potentially eligible to the NRHP. This management action results in a beneficial impact to NHTs and Other Historic Trails. With concurrence from a private landowner, the BLM helps mitigate or otherwise helps protect NHT and Other Historic Trail sites identified by the Historic Trails Management Plan (BLM 1986a), a beneficial impact to NHTs and Other Historic Trails.

According to the Interagency Agreement No. K910-A3-0013 with the National Park Service (NPS) Fort Laramie National Historic Site (NHS), four parcels (the Fort Laramie "A" Segment, the Old Bedlam Segment, the tract adjacent to the south boundary, and the tract south of Old Bedlam) are available for exchange or for transfer to the NPS, resulting in a beneficial impact to these trail resources. The existing Fort Laramie withdrawal, which segregates from operations of the public land laws, including the mining and mineral leasing laws, continues, but no additional withdrawals are identified.

The Oregon Trail Road ROW Corridor, Segment A, currently is managed for use by all types and sizes of facilities. To the extent possible, the southern ½ mile of the corridor width is to be used for powerlines and overhead facilities, and the northern ½ mile is to be used for pipelines and other buried facilities. NSO is not permitted on parcels of the Bozeman Trail in Converse County (Appendix W) and additional parcels are added as inventory and evaluation discloses suitable trail segments. These management actions result in a beneficial impact to the Bozeman Trail.

Alternative B

Surface-disturbing Activities. Under Alternative B, the projected short-term disturbance acreage (36,650 acres) from BLM actions is the lowest of any alternative (refer to Table 4-1). As in Alternative A, the net potential disturbance to historic properties is lessened by the requirement to conduct inventories and properly deal with such properties prior to any disturbance.

The impacts to NHTs and Other Historic Trails from surface-disturbing activities under Alternative B are anticipated to be adverse, similar in type to Alternative A, and commensurate with the locations and intensity of RFAs shown in Appendix M when they coincide with trails. However, the intensity of adverse impacts to cultural resources from surface-disturbing activities under Alternative B is anticipated to be less than Alternative A and the least relative to all other alternatives.

Relative to Alternative A and other alternatives, Alternative B incorporates the most restrictions on surface-disturbing activities. Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative B provide additional protection for NHTs and Other Historic Trails. Using soils, for example, under Alternative B NSO is permitted on highly erodible soils and long-term surface disturbance is limited. These types of management actions result in beneficial impacts to cultural resources.

Land Disposal and Acquisition. The types of impacts from disposal of BLM-administered surface land under Alternative B are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative B, 109,210 acres of BLM-administered surface is identified for disposal by sale, approximately 5-percent more than proposed under Alternative A. Disposal of BLM-administered surface results in an adverse impact to NHTs and Other Historic Trails as described in Alternative A.

Mitigation of adverse impacts as described in Alternative A reduces the actual amount of adverse impacts. Likewise, acquiring lands within the planning area result in a beneficial impact to NHTs and Other Historic Trails due to the protective measures offered under federal ownership. As discussed in Alternative A, public land containing NHTs and Other Historic Trails likely are not targeted for land-tenure adjustment.

Access. The indirect adverse impacts of access from development and OHV use under Alternative B are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative B proposes the least amount of development by alternative (as represented by surface disturbance numbers in Table 4-1) and provides the smallest area (909,651 acres) for OHV use limited to existing roads and trails, a 31-percent decrease from Alternative A (1,311,715 acres). These actions result in an indirect adverse impact to NHTs and Other Historic Trails, but a less adverse impact than under Alternative A.

Proactive NHTs and Other Historic Trails Management Actions. Under Alternative B, there is an NSO restriction for ¼ mile from the edges of the trail, or the visual horizon, whichever is closer. A CSU restriction is in place from ¼ mile up to a 5-mile foreground/middle-ground viewshed of NHTs and Other Historic Trails. Under Alternative B, visual resources are managed as VRM Class II until inventories are completed. Trail segments contributing to the overall eligibility and which retain integrity of setting are managed as VRM Class II (see Glossary). Where integrity of setting is absent, the foreground/middle-ground are managed as Class III. Proactive management actions under Alternative B generally result in beneficial impacts to NHTs and Other Historic Trails. Unlike Alternative A, federal minerals are withdrawn from locatable entries within a 3-mile viewshed of trails, resulting in a beneficial impact.

As in Alternative A, NSO is allowed on specific Oregon Trail segments identified in Appendix W that does not benefit the preservation or interpretation of the trail. The BLM reassesses the need to include other sites as they may be identified. Prohibiting disturbance on privately owned portions of the trails (listed in the 1985 RMP) are pursued through agreements between the BLM and private landowners. These management actions result in beneficial impacts to the Oregon Trail.

BLM parcels adjacent to Fort Laramie NHS continue to be managed under the agreement with the Fort Laramie NHS. Areas with pristine segments are subject to increased VRM requirements. In addition, mineral withdrawals and transfers to the NPS are pursued for parcels described in the MOU. The existing Fort Laramie withdrawal, which segregates from operations of the public land laws, including the mining and mineral leasing laws, continues and is enlarged by 149 acres. Under Alternative B, the BLM pursues transfers, exchanges, agreements, conservation easements, or other management agreements with private and public landowners to preserve historic and recreational values in a 13-mile corridor between Fort Laramie and Guernsey. These proactive management actions result in beneficial impacts to NHTs and Other Historic Trails. Compared to Alternative A, Alternative B offers greater protection to NHTs and Other Historic Trails.

No additional ROW facilities are allowed within the Oregon Trail Road ROW corridor, Segment A, resulting in beneficial impacts to NHTs and Other Historic Trails. NSO is permitted on parcels of the Bozeman Trail in Converse County (Appendix W) and additional parcels are added as inventory and evaluation disclose suitable trail segments. These management actions result in beneficial impacts to the Bozeman Trail.

Alternative C

Surface-disturbing Activities. Under Alternative C, the projected short-term disturbance acreage (58,689 acres), from BLM actions result in the fourth-highest disturbance acreage following alternatives

E, D, and A, respectively (refer to Table 4-1). The net potential disturbance to historic properties is lessened by the requirement to conduct inventories and properly deal with such properties prior to any disturbance.

The impacts to NHTs and Other Historic Trails resources from surface-disturbing activities under Alternative C are anticipated to be adverse, similar in type to Alternative A, and commensurate with the locations and intensity of RFAs shown in Appendix M. However, the intensity of adverse impacts to cultural resources from surface-disturbing activities under Alternative C is anticipated to be less than under Alternative A.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative C provide additional protection for cultural resources. For example, under Alternative C, surface disturbance on highly erosive soils is minimized to the extent practicable and NSO is allowed on slopes greater than 25 percent with highly erosive soils. These types of management actions result in beneficial impacts to cultural resources.

Land Disposal and Acquisition. The types of impacts from disposal of BLM-administered surface under Alternative C are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative C, 241,364 acres of BLM-administered surface are identified for disposal by sale, approximately 223-percent more than proposed under Alternative A (103,725 acres). Disposal of BLM-administered surface results in an adverse impact to NHTs and Other Historic Trails as described in Alternative A. Likewise, acquiring lands within the planning area results in a beneficial impact to NHTs and Other Historic Trails due to the protective measures offered under federal ownership. Since NHTs and Other Historic Trails are of high value, it is unlikely that public lands bearing evidence of historic trails would be considered for land-tenure adjustment. Moreover, any lands involved in such an adjustment would be subject to normal Section 106 compliance before any action is taken (i.e., inventory, evaluation, consultation with SHPO if necessary, development, and implementation of approved treatment).

Access. The indirect adverse impacts of access from development and OHV use under Alternative C are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative C proposes a decrease in development compared to Alternative A (as represented by surface disturbance numbers in Table 4-1), and Alternative C designates the third highest acreage (along with Alternative E) to OHV use limited to existing roads and trails (1,162,113 acres), an 11-percent decrease from Alternative A (1,311,715 acres). These actions result in indirect adverse impacts to NHTs and Other Historic Trails. The impacts are similar in intensity to those identified in Alternative A.

Proactive NHT and Other Historic Trails Management Actions. Under Alternative C, CSU restriction is in place to a 3-mile foreground viewshed of NHTs and Other Historic Trails. Under Alternative C, the foreground and middle-ground of NHTs and Other Historic Trails are managed as VRM Class II until inventories are completed. Trail segments contributing to the overall eligibility and for which the setting retains integrity will be managed as VRM Class II. Where integrity of setting is absent, the foreground and middle-ground of NHTs are managed as Class III. While proactive management actions under Alternative C generally result in beneficial impacts to NHTs and Other Historic Trails, the CSU restriction in Alternative C compared to the NSO restriction in Alternative A could result in an adverse impact to NHTs and Other Historic Trails within the ¼ mile or visual horizon protected in Alternative A. However, the CSU restriction between ¼- and the 3-mile foreground and middle-ground viewshed results in a beneficial impact to NHTs and Other Historic Trails. Unlike Alternative A, federal minerals are withdrawn within a ¼ mile of historic trails and prominent landforms within the 3-mile viewshed, resulting in beneficial impacts to NHTs and Other Historic Trails.

Under Alternative C, the impacts of the NSO allowed on specific Oregon Trail segments identified in Appendix W are the same as those identified in Alternative B. Impacts to Fort Laramie trail segments are the same as those identified in Alternative A. The withdrawal from mining and mineral leasing, as identified in Alternative B, is continued under Alternative C. Subsurface or low-profile surface facilities may be allowed within the Oregon Trail Road ROW Corridor, Segment A, resulting in beneficial impacts to NHTs and Other Historic Trails. These management actions provide a greater degree of protection than those identified in Alternative A. Impacts to the Bozeman Trail are similar to those identified in Alternative B. Alternative C provides fewer beneficial impacts than Alternative B, but more than alternatives A, D, or E.

Alternative D

Surface-disturbing Activities. Under Alternative D, the projected short-term disturbance acreage (63,649 acres) from BLM actions results in the highest disturbance acreage of all the alternatives (refer to Table 4-1). The net potential disturbance to NHTs and Other Historic Trails is lessened by the requirement to conduct inventories and properly deal with such properties prior to any disturbance.

The impacts to trail resources from surface-disturbing activities under Alternative D are anticipated to be adverse, similar in type to Alternative A, and commensurate with the locations and intensity of RFAs shown in Appendix M. However, the intensity of adverse impacts to cultural resources from surface-disturbing activities under Alternative D is anticipated to be more than under Alternative A. No surface-disturbing activity is permitted without prior compliance with Section 106 of the NHPA.

Fewer restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) are provided under Alternative D; therefore, additional protection for cultural resources under Alternative D is less than all other alternatives. These types of management actions result in beneficial impacts to cultural resources; however, to a lesser extent than under any other alternative.

Land Disposal and Acquisition. The types of impacts from disposal of BLM-administered surface under Alternative D are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative D, 224,834 acres of BLM-administered surface land are identified for disposal by sale, approximately 217-percent more than proposed under Alternative A (103,725 acres). Disposal of BLM-administered surface results in adverse impacts to NHTs and Other Historic Trails as described in Alternative A. Likewise, acquiring lands within the planning area results in a beneficial impact to NHTs and Other Historic Trails due to the protective measures offered under federal ownership. As noted above, the high value of NHTs and Other Historic Trails prevents their inclusion in land-tenure adjustments.

Access. The indirect adverse impacts of access from development and OHV use under Alternative D are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative D proposes an increase in development compared to Alternative A (as represented by surface disturbance numbers in Table 4-1) and the highest level of development of all the alternatives. Alternative D designates the second-highest acreage to OHV use limited to existing roads and trails (1,292,630 acres), a 1-percent decrease from Alternative A (1,311,715 acres). These actions result in an indirect adverse impact to NHTs and Other Historic Trails. The adverse impacts under Alternative E are greater than those identified in Alternative A, as well as all other alternatives.

Proactive NHT and Other Historic Trails Management Actions. A CSU restriction is allowed within ¼ mile or the visual horizon (whichever is closer) of NHTs and Other Historic Trails, and visual resources in the foreground and middle-ground are managed under the classes defined in the 2004 VRM

inventory (see Glossary). These proactive measures result in beneficial impacts to NHTs and Other Historic Trails, but are less protective compared to alternatives B, C and E. As in Alternative A, federal minerals are not withdrawn. Compared to alternatives B, C, and E, this is an adverse impact to NHTs and Other Historic Trails.

Impacts of the NSO allowed on specific Oregon Trail segments, identified in Appendix W, are the same as those identified in Alternative B. No agreements between the BLM and private landowners are pursued, resulting in an adverse impact to trail segments. Overall, these management actions will continue to have beneficial impacts to the Oregon Trail.

The existing MOU with the Fort Laramie National Historic Site will be allowed to expire and BLM will not enter into agreements prohibiting surface disturbance on private trail segments, and the withdrawal as identified in Alternative B will continue. Additional ROW facilities will be allowed on a case-by-case basis within the Oregon Trail Road ROW Corridor, Segment A. Impacts to the Bozeman Trail are similar to those identified in Alternative B. Impacts to NHTs and Other Historic Trails are greater under Alternative D than under the other alternatives.

Alternative E (Preferred Alternative)

Surface-disturbing Activities. Under Alternative E, the projected short-term disturbance acreage (61,274 acres) from BLM actions results in the second-highest disturbance acreage following Alternative D (refer to Table 4-1). As in all other alternatives, the net potential disturbance to NHTs and Other Historic Trails is lessened by the requirement to conduct inventories and properly deal with such properties prior to any disturbance.

The impacts to trail resources from surface-disturbing activities under Alternative E are anticipated to be adverse, as is the case for all alternatives, and commensurate with the locations and intensity of RFAs shown in Appendix M. However, the intensity of adverse impacts to cultural resources from surface-disturbing activities under Alternative E is anticipated to be more than under Alternative A. The net potential disturbance to NHTs and Other Historic Trails is lessened by the requirement to conduct inventories and properly deal with such properties prior to any disturbance.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative E provide additional protection for cultural resources. Using soils again, actions selected to minimize adverse effects to soils include relocating disturbance in areas of erodible soils and limiting total long-term disturbance. These types of management actions result in beneficial impacts to cultural resources.

Land Disposal and Acquisition. The types of impacts from disposal of BLM-administered surface under Alternative E are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative E, 224,834 acres of BLM-administered surface are identified for disposal by sale, approximately 217-percent more than proposed under Alternative A (103,725 acres). Disposal of BLM-administered surface results in adverse impacts to NHTs and Other Historic Trails as described in Alternative A. Likewise, acquiring lands within the planning area results in a beneficial impact to NHTs and Other Historic Trails due to the protective measures offered under federal ownership.

Access. The indirect adverse impacts of access from development and OHV use under Alternative E are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative E proposes an increase in development compared to Alternative A (as represented by surface-disturbance numbers in Table 4-1), and Alternative E designates the third-highest acreage (along with Alternative D) to OHV use limited to existing roads and trails (1,162,244), an 11-percent decrease from Alternative A

(1,311,715). These actions result in an indirect adverse impact to NHTs and Other Historic Trails; however, the impacts under Alternative E are similar in intensity to those identified in Alternative A.

Proactive NHT and Other Historic Trails Management Actions. Under Alternative E, where the historic setting does not contribute to the NRHP eligibility of a trail or trail segment, the existing physical features and associated sites are managed so that the trail trace and associated sites are protected from physical impacts; a CSU restriction is in place within ¼ mile or the visual horizon, whichever is closer; ROW crossings at previously undisturbed areas are at right angles to the trail; and visual resources are managed in accordance with the VRM Class established for the area.

Under Alternative E, where the historic setting contributes to the NRHP eligibility of a trail or trail segment, existing physical features and associated sites are managed so the trail trace and associated sites are protected from physical impacts; a CSU restriction extends to the viewshed foreground (out to a maximum of 3 miles) or the visual horizon, whichever is closer, to ensure surface-disturbing activities avoid trail remains and the land immediately surrounding them. Beyond 3 miles, impacts are managed to comply with Section 106 of the NHPA. ROW crossings at previously undisturbed areas are at right angles to the trail, and mineral leasing continues with a CSU restriction. Fences and range improvements are permitted. The setting associated with these historic trails are managed to maintain the existing character of the landscape. The viewshed foreground is managed to VRM Class II (see Glossary) and mineral leasing continues with a CSU restriction. Regardless of the contributing or noncontributing nature of an associated setting, locatable minerals are withdrawn within ¼ mile of existing historic trail segments, and prominent landforms associated with the trail are withdrawn to locatable entry operations, including disposal. These management actions have beneficial impacts to NHTs and Other Historic Trails.

Impacts of the NSO allowed on specific Oregon Trail segments identified in Appendix W for Alternative E are the same as those identified in Alternative B.

Under Alternative E, the BLM continues to manage selected Oregon Trail segments (Appendix W) according to the interagency agreement with the NPS. The withdrawal continues as identified in Alternative B. Impacts from the Oregon Trail Road ROW Corridor, Segment A, are the same as those identified in Alternative C. These management actions provide a greater degree of protection than those identified in Alternative A. Impacts to the Bozeman Trail are similar to those identified in Alternative D.

4.7.3.3 Conclusion

Meaningful differences in land disposal and acquisition, access, and proactive management actions form the basis for the following conclusions. Impacts to NHTs and Other Historic Trails from the alternatives are anticipated to be similar in type, but different in intensity. Among the management alternatives, Alternative B provides a greater level of protection and preservation for NHTs and Other Historic Trails resources; alternatives C and E provide somewhat fewer protections, and alternatives A and D provide the fewest protections. Alternative A permits beneficial surface disturbance on the NHTs and Other Historic Trails, but does not provide additional viewshed protections. Alternative E provides protections where a historic setting contributes to the NRHP eligibility of a trail or trail segment, and a lesser level of protection to settings that do not contribute to NRHP eligibility. Management of visual resources associated with NHTs and Other Historic Trails are at the Class II level until inventories are completed; non-contributing trail segments thus far identified are managed at Class III. Development projects could cross NHTs and Other Historic Trails at right angles in areas of existing disturbance. Under Alternative E, mineral leasing continues, but locatable minerals within ¼ mile of NHTs and Other Historic Trails are withdrawn. Fences and other range improvements are permitted if they cause no new disturbance and if they can be comport with applicable VRM class. Cooperative management of public land tracts adjacent

to Fort Laramie will continue, an existing minerals withdrawal will continue, and easements or other access rights will be pursued for the 13 miles of trail between Fort Laramie and Guernsey.

The ¼ mile buffer protecting NHTs and Other Historic Trails is comprised of 21,954 acres of BLM-administered surface and 238,614 acres of BLM-administered minerals. High-to-moderate conventional oil and gas potential areas comprise 6,724 acres, and high-to-moderate CBNG acreage is 1,773 acres. No high-to-moderate potential has been identified for trona or phosphorus. Bentonite, gypsum and limestone have comparable high-to-moderate potential acreage ranging from 1,132 acres for gypsum to 3,962 acres for bentonite. NSO restrictions associated with NHT and Other Historic Trails impact 3.1 percent of the high development potential for leasable minerals in alternatives A and B. Alternative B withdraws 924,153 acres of locatable minerals in the foreground and middle-ground viewshed. In alternatives C and D, a CSU restriction is established for the trails corridors, but no acreage would be removed from lease, location, or disposal actions. Viewshed constraints apply; however, this would still remain a CSU restriction. Alternative E places CSU restrictions on approximately 21,954 acres of BLM-administered surface to protect the NHTs and Other Historic Trails setting and withdraws 238,614 acres of locatable minerals from ¼ mile to either side of the trail plus approximately 15,000 acres surrounding prominent landforms within the three-mile viewshed.

Other resources and programs are expected to benefit from trails alternatives that serve to reduce surface disturbance.

4.7.4 Wild and Scenic Rivers

Actions that could occur through implementing each alternative have the potential to impact Wild and Scenic River segments. As appropriate, impacts are described as beneficial or adverse.

Of the Wild and Scenic River segments, only the North Platte River segment is an important recreational resource on BLM-administered lands. Direct impacts to the byways include any actions that substantially limits or prevents the use of the byways.

4.7.4.1 Methods and Assumptions

The methods and assumptions used in this analysis include the following:

- Alternative A is an interim management alternative for which the BLM takes no action to change the status of the subject waterways.
- Alternative B assumes that all segments are designated under the Wild and Scenic Rivers Act.
- Alternatives C, D, and E call for no designation.

4.7.4.2 Analysis of Alternatives

Impacts Common to All Alternatives

Management of the eligible segments change substantially across alternatives, but with the exception of the North Platte River, none has any significant recreational value or any substantial public interest. Designation and interim management preserve the values that exist indefinitely, providing an opportunity for natural processes to determine the overall character of the waterways through the long term. Preservation protects riparian vegetation, protects their visual character, and prevents diversion of the water or any other changes that alter the wildland nature of the segments.

Alternative A

Alternative A indefinitely places the eligible segments in an interim management situation. The qualities that qualified them as eligible are afforded protection. Actions that alter their character are not allowed. The undeveloped nature of the stream segments are preserved.

Alternative B

This alternative designates the segments as components of the Wild and Scenic Rivers System. Accordingly, the characteristics that caused them to qualify for consideration are preserved. Their wild character is protected.

Alternatives C, D, and E

Under these alternatives none of the segments are designated under the Wild and Scenic Rivers Act. They would return to a multiple use management status and immediately be available for development or other actions that would change their characters. The wildland nature of the segments could be lost. This is not a major adverse impact because these segments are of minor importance to wildlands. Some, like the North Platte River segment, already may have protection under present management. There are no known threats, at least in the short term, so adverse impacts, if any, would occur in the long term.

4.7.4.3 Conclusion

Management actions described in this section for all alternatives were used to determine the potential impacts to Wild and Scenic Rivers. Alternatives A and B protect the segments under provisions of the Wild and Scenic Rivers Act, but for the remaining alternatives, that protection is not available.

4.8 Socioeconomic Resources

The Socioeconomic Resources section describes the potential impacts to social and economic conditions, abandoned mine lands (AMLs), formerly used defense sites (FUDS), hazardous materials, and environmental justice, with respect to each alternative. Within each resource, impacts commons to all alternatives and the methods and assumptions used for the analyses are described.

4.8.1 Social Conditions

This section addresses the potential for the alternatives to have impacts on social conditions in the planning area, including direct, indirect, short-term, and long-term impacts. Appendix B identifies laws, regulations, policies, and guidance considered in the analysis of social conditions.

Potential impacts related to social conditions include changes in population, such as fluctuations caused by economic boom and bust cycles; changes in the demand for housing and community services, along with community fiscal conditions, which can impact the ability of state, regional, and local governments to supply community services such as education; and changes in community character, culture, and social trends. The BLM does not directly manage social conditions in the planning area; however, BLM management actions could impact social conditions indirectly. For example, a decision to prohibit future oil and gas exploration or leasing on federal mineral estate could adversely impact job opportunities in the planning area, which could lead to reductions in populations in parts of the planning area as residents move away to find job opportunities elsewhere (or as fewer people move to the planning area for jobs). For the purpose of this analysis, short-term social impacts are defined as those that last for 5 years or less; long-term social impacts are defined as those that would last for more than 5 years.

4.8.1.1 Methods and Assumptions

Impacts to social conditions associated with each of the alternatives are compared to existing conditions and trends in the planning area to establish a context for the impacts. Social impacts are classified into three broad categories: (1) impacts on population, (2) impacts on housing and community services, and (3) impacts on custom, culture, and social trends.

Methods and assumptions used in this impact analysis include the following:

- Economic conditions, especially jobs, labor earnings, and economic output, continue to drive population growth in the planning area.
- Any population change that could reasonably be associated with the alternatives will likely be due to changes in employment opportunities.
- Federal, state, and local taxes continue to be collected on minerals produced in the planning area.
- The pace and timing of economic development in the planning area will continue to depend on many factors beyond the management actions of the BLM. Because the pace of development in the planning area is unknown, the economic impact analysis—which influences the social impact analysis because of the link between employment opportunities and population—assumes a relatively constant rate of development. Thus, actual social and economic impacts could differ if the rate of development changes.

4.8.1.2 Analysis of Alternatives

Impacts Common to All Alternatives

Any population change that could reasonably be associated with the alternatives will likely be due to changes in employment opportunities. Employment opportunities related to activities on BLM-administered land and federal mineral estate include jobs in exploration, development, and production of minerals, including oil and gas, coal, locatable minerals such as uranium, and salable minerals, such as sand and gravel; jobs in livestock production; jobs in various recreational activities and OHVs; and other types of jobs that rely on land administered by the BLM, such as management of wildlife and plant species that use BLM-administered lands. The economic analysis provides quantitative estimates of employment in the planning area due to oil and gas, coal, grazing, and recreational activities on BLM-administered lands and real estate. These quantitative estimates are used to aid in the analysis of impacts on population.

As indicated in the Economic Conditions section later in this chapter, the BLM does not expect production of locatable or salable minerals to vary substantially by alternative. One implication is that employment opportunities associated with exploration, development, and production of locatable and salable minerals are not likely to vary substantially by alternative. This does not mean that these employment opportunities are insignificant or unimportant.

In all alternatives, if the pace of development differs from the relatively constant rate assumed in this analysis, there could be short-term impacts on demand for housing and community services and on the supply of tax revenues from residences or businesses to support community services due to short-term changes in job opportunities and the resulting change in in-migration or out-migration trends. It would likely be more difficult for smaller communities to absorb a sudden influx of new residents, or to continue to support existing infrastructure if out-migration suddenly increased.

Finally, in all alternatives, the BLM continues to consider socioeconomic impacts of site-specific actions and incorporates socioeconomic issues into analyses of environmental, social, and economic impacts, such as the analyses required by NEPA for certain future site-specific actions.

Alternative A

Impacts on Population

In Alternative A, activities on BLM-administered land and federal mineral estate related to oil and gas, coal, livestock grazing, and recreation continue to support an average of 3,050 full-time and part-time jobs per year, representing about 4.6 percent of total employment in the planning area as of 2003. It is important to note that this does not constitute an increase of 3,050 jobs per year over current employment; it more closely represents an estimate of the contribution of certain activities on BLM-administered lands and federal mineral estate to overall employment in the planning area.

As described in the analysis of impacts on economic conditions, most of these job opportunities are related to oil, gas, and coal. Most of the jobs are located in Converse and Natrona counties, especially in and near Casper due to that city's role as an oil and gas service center. Any increases in population due to employment opportunities in Converse and Natrona counties contribute to the recent steady increase of population in those two counties. Less-densely populated towns or unincorporated areas in the planning area could also experience population increases as a result of continued employment opportunities. Depending on the pace of development, which is largely determined by forces other than BLM management actions, there may be short-term increases in population, which these areas may be less able to absorb.

Impacts on Housing and Community Services

Changes in population could change the demand for housing and community services, such as roads, schools, and police and fire protection. As described in Chapter 3, county-wide vacancy rates in 2000 (the latest year for which county-level data are available) were 10 percent in Natrona, 17 percent in Converse, 14 percent in Goshen, and 20 percent in Platte County. These percentages represent about 3,000 vacant units in Natrona, 1,000 vacant units in Converse, 820 in Goshen, and about 900 in Platte County. The annual average number of jobs predicted under this alternative does not result in a substantial impact on the availability of housing. As noted in the section on impacts common to all alternatives, if development occurs slower or faster than the relatively steady pace assumed in the analysis, there could be short-term impacts on demand for housing and community services, as well as on the supply of tax revenues from residences or businesses to support community services. It could be more difficult for smaller communities to absorb sudden changes of this nature.

Impacts on demand for community services are similar to those described for the housing stock. Increased job opportunities could support the recent steady population growth, which leads to increased demand for community services. If national and international energy prices, operator business strategies, or other factors lead to a rapid pace of development, there could be sudden short-term increases in demand for community services as a result of new jobs and increased population. However, local and state tax revenues collected from energy production could help to mitigate short-term increases in demand for services, since tax revenues help to pay for community services.

Impacts on Custom, Culture, and Social Trends

Alternative A maintains existing conditions, lets other forces lead changes in the planning area, and allows social conditions to be directed by forces other than a substantive change in BLM management. Although there are specific interest groups with particular interests regarding specific land uses (e.g., wilderness advocates, oil and gas interests, ranchers), on the whole, residents of the planning area tend to support both conservation of natural resources and the economic viability of resource-based industries. For this reason, residents generally support multiple use of BLM lands, including the development of mineral and energy resources, livestock grazing authorizations, opening of lands to recreation, and conservation of wildlife and native vegetation. This alternative continues BLM's current practice of allowing multiple uses. As indicated in the section on impacts common to all alternatives, under this alternative, as under all the alternatives, the BLM continues to incorporate socioeconomic considerations into the planning process and perform socioeconomic analyses as required for site-specific actions.

Alternative B

Impacts on Population

Activities on BLM-administered land and federal mineral estate in this alternative related to oil and gas, coal, recreational, and livestock grazing support an average of 1,656 jobs per year, resulting in about 2.5 percent of total employment in the planning area as of 2003. This represents a sizable decrease in employment opportunities compared to the No Action Alternative. Most of the decrease in employment opportunities compared to Alternative A is in oil and gas (about 1,400 jobs per year). Recreational employment opportunities increase very slightly, by about 11 jobs per year. The decrease in oil- and gas-related employment could result in a slower rate of population growth in the planning area, particularly in Converse and Natrona counties, than that observed in recent years. However, as indicated in the Economic Conditions analysis, there is proportionately more oil and gas activity on state and private land, and differences in employment opportunities taking state and fee land into account represent about 1,000 jobs per year.

Impacts on population trends are most likely be felt in Casper because of that city's role as a service center for oil and gas activity, but could also be felt in less-densely populated towns or unincorporated areas in the planning area. These areas could experience population decreases or increases as a result of changing employment opportunities, depending on where drilling and production activity occurs. Depending on the pace of development, which is largely determined by forces other than BLM management actions, short-term increases or decreases in population may occur, which these areas may be less able to absorb.

Impacts on Housing and Community Services

Changes in population could change the demand for housing and community services, such as roads, schools, and police and fire protection, while changes in tax revenues due to mineral production could change the ability of communities to pay for community services. The annual average number of jobs predicted under this alternative may contribute to a slight decrease in demand for housing and community services compared to Alternative A, particularly in Casper. As noted in the section on impacts common to all alternatives, if development occurs more slowly or faster than the relatively steady pace assumed in the analysis, there could be short-term impacts on demand for housing and community services, as well as on the supply of tax revenues from residences or businesses to support community services. It would likely be more difficult for smaller communities to absorb sudden changes of this nature.

Impacts on demand for community services are similar to those described for the housing stock; that is, there may be a slight decrease in demand for community services compared to Alternative A. In addition, some areas may experience declining tax revenues due to a decrease in oil and gas activity compared to Alternative A, which could impact a community's ability to fund and provide services. However, local and state tax revenues collected from energy production help mitigate short-term increases in demand for services, since tax revenues help to pay for community services. Production on private and state land is forecasted to constitute a larger share of overall production in this alternative, and state and local taxes are still collected from production on these lands. If national and international energy prices, operator business strategies, or other factors lead to a rapid pace of development, there could be sudden short-term increases in demand for community services as a result of new jobs and increased population.

Impacts on Custom, Culture, and Social Trends

Alternative B provides for less economic development than Alternative A, but retains natural and rural conditions to a greater degree than Alternative A. Alternative B indirectly impacts the social well-being of communities in the planning area with restrictions on economic development via the use of resources. This alternative would continue the BLM's current strategy of allowing multiple uses, but with more emphasis on resource protection.

As indicated in the section on impacts common to all alternatives, the BLM continues to incorporate socioeconomic considerations into the planning process and perform socioeconomic analyses as required for site-specific actions. Under Alternative B, the BLM provides these analyses with the explicit goal of mitigating impacts through collaborative management where possible. Also, under this alternative, the BLM attempts to minimize the conflicts associated with mineral extraction while stressing a balanced approach to diversify and enhance local economies, such as by stressing the development of renewable energy and recreational opportunities. Thus, under this alternative, impacts on custom, culture, and social trends tend to be reduced compared to Alternative A because of the BLM's increased emphasis on collaborative management and the minimization of conflicts associated with mineral extraction.

Alternative C

Impacts on Population

Oil, gas, coal, recreational, and livestock grazing activities on BLM-administered land and federal mineral estate support an average of 2,931 jobs per year, representing about 4.4 percent of total employment in the planning area as of 2003. This represents a small decrease in employment opportunities (by about 118 jobs per year) compared to Alternative A, all of which are in oil and gas. Recreational employment opportunities increase very slightly, while grazing-related employment opportunities remain the same. The decrease in oil and gas-related employment impact Converse and Natrona counties and Casper in particular, but are probably too small to impact the overall population trend observed in recent years.

As in the other alternatives, there may be short-term population changes in less-densely populated communities in the planning area, depending on the pace of development (largely determined by forces other than BLM management actions). These areas could experience population decreases or increases as a result of changing employment opportunities, depending on where drilling and production activity occurs and at what pace.

Impacts on Housing and Community Services

The annual average number of jobs predicted under this alternative may contribute to a small decrease in demand for housing and community services compared to Alternative A, particularly in Casper. As noted in the section on impacts common to all alternatives, if development occurs more slowly or faster than the relatively steady pace assumed in the analysis, there could be short-term impacts on demand for housing and community services, as well as on the supply of tax revenues from residences or businesses to support community services. It would likely be more difficult for smaller communities to absorb sudden changes of this nature.

If national and international energy prices, operator business strategies, or other factors lead to a short-term increase in the pace of development, there could be short-term increases in demand for community services as a result of new jobs and increased population. However, local and state tax revenues collected from energy production could help to mitigate short-term increases in demand for services, since tax revenues help to pay for community services.

Impacts on Custom, Culture, and Social Trends

Alternative C blends the characteristics of alternatives A and B; it continues the BLM's current strategy of allowing multiple uses, but with slightly more emphasis on resource protection. Compared to Alternative A, Alternative C provides somewhat more protection for natural and rural conditions.

As indicated in the section on impacts common to all alternatives, the BLM continues to incorporate socioeconomic considerations into the planning process and perform socioeconomic analyses as required for site-specific actions. Under Alternative C, the BLM provides these analyses to promote a common understanding of impacts, but without explicit mitigation plans. Under this alternative, impacts on custom, culture, and social trends from future site-specific actions tend to be similar to those under Alternative A.

Alternative D

Impacts on Population

Oil, gas, coal, recreational, and livestock grazing activities on BLM-administered land and federal mineral estate continue to support an average of 3,023 jobs per year, representing about 4.6 percent of

total employment in the planning area as of 2003. This includes a very small decrease in oil and gas employment opportunities (about 21 jobs per year on average) and a very small decrease in recreational related job opportunities (about 6 jobs per year on average) compared to Alternative A. Livestock grazing job-related opportunities are about the same as Alternative A. The impacts of this alternative on overall population, including geographic differences, generally would be the same as for Alternative A.

Impacts on Housing and Community Services

As in Alternative A, the annual average number of jobs predicted under this alternative is not likely to result in a substantial impact on the availability of housing. As noted in the section on impacts common to all alternatives, if development occurs more slowly or faster than the relatively steady pace assumed in the analysis, there could be short-term impacts on demand for housing and community services, as well as on the supply of tax revenues from residences or businesses to support community services. It is likely that it will be more difficult for smaller communities to absorb sudden changes of this nature. Impacts on demand for community services are similar to those described for Alternative A.

Impacts on Custom, Culture, and Social Trends

The impacts on custom, culture, and social trends associated with Alternative D are generally similar to those of Alternative A. However, eliminating SDW withdrawals in this alternative could lead to substantial impacts on livestock operators within the planning area who use the SDWs to transfer animals from one pasture to another. Depending on how operators respond to the revocation of withdrawals, this alternative could lead to a decline in cattle ranching in the planning area, which could, in turn, impact land use and culture, especially in Natrona and Converse counties (where more land is authorized for grazing).

As indicated in the section on impacts common to all alternatives, the BLM continues to incorporate socioeconomic considerations into the planning process and performs socioeconomic analyses as required for site-specific actions. Under Alternative D, the BLM provides quantitative analyses that have been developed for proposed site-specific actions without explicit mitigation plans, except for any that are required under NEPA. Under this alternative, impacts on custom, culture, and social trends from future site-specific actions tend to be similar to those under Alternative A.

Alternative E (Preferred Alternative)

Impacts on Population

Oil, gas, coal, recreational, and livestock grazing activities on BLM-administered land and federal mineral estate support an average of 3,044 jobs per year, representing about 4.6 percent of total employment in the planning area as of 2003. Most of these job opportunities are related to oil, gas, and coal, and are located in Converse and Natrona counties, especially in and near Casper due to the city's role as an oil and gas service center. Any increases in population due to employment opportunities in Converse and Natrona counties contribute to the recent steady increase of population in those two counties. As in Alternative A, less densely populated communities could also experience population increases as a result of continued employment opportunities. Depending on the pace of development, there may be short-term increases in population in these communities.

Impacts on Housing and Community Services

The annual average number of jobs predicted under this alternative could result in impacts on the availability of housing similar to those of Alternative A. As noted in the section on impacts common to all alternatives, if development occurs more slowly or faster than the relatively steady pace assumed in the analysis, there could be short-term impacts on demand for housing and community services, as well as

on the supply of tax revenues from residences or businesses to support community services. It could be more difficult for smaller communities to absorb sudden changes of this nature.

Impacts on demand for community services are similar to those described under Alternative A. Increased job opportunities could support the recent steady population growth, which could lead to an increased demand for community services. Depending on forces other than BLM management actions that impact the pace of development, there could be short-term increases in demand for community services as a result of new jobs and increased population. However, local and state tax revenues collected from energy production could help mitigate short-term increases in demand for services, since tax revenues help to pay for community services.

Impacts on Custom, Culture, and Social Trends

Alternative E maintains the BLM's policy of supporting multiple land uses, including developing mineral and energy resources, livestock grazing authorizations, recreational opportunities, and conservation of wildlife and native vegetation. Alternative E indirectly impacts the social well-being of communities in the planning area with minor restrictions on economic development in localized areas via the management of multiple resources on BLM-administered lands. Compared to Alternative A, Alternative E emphasizes greater resource protection, but still allows for development of natural resources.

As indicated in the section on impacts common to all alternatives, the BLM continues to incorporate socioeconomic considerations into the planning process and perform socioeconomic analyses as required for site-specific actions. Under Alternative E, the BLM provides these analyses with the explicit goal of mitigating impacts through collaborative management, where possible. Also under this alternative, the BLM attempts to minimize the conflicts associated with mineral extraction while stressing a balanced approach to diversify and enhance local economies, such as by stressing the development of renewable energy and recreational opportunities. Thus, under Alternative E, impacts on custom, culture, and social trends tend to be reduced compared to Alternative A because of the BLM's increased emphasis on collaborative management and the minimization of conflicts associated with mineral extraction.

4.8.1.3 Conclusion

Social conditions are related primarily to economic conditions that may influence the growth or development of employment and income. The economic sectors in the planning area that are most likely to be directly impacted by BLM management actions are related to the service sector and resource development (oil, gas, and mining) activities. That is not to imply that grazing, ranching, and other agricultural activities are not impacted or unimportant. However, based on their economic contributions to the overall economy, changes in these sectors are expected to produce relatively minor economic impacts in the overall economy. Nonetheless, the agricultural sector in the planning area is quite influential in terms of community character and identity. Thus, land management decisions impacting the agricultural sector could have far-reaching impacts on the social structure in the planning area, even though the economic impact is not expected to be substantial.

Table 4-18 provides a summary of impacts on social conditions as discussed in this section for alternatives B through E compared to the No Action Alternative. Although the table attempts to summarize impacts and characterize them as low, medium, or high, it does not classify these impacts as beneficial or adverse. Social impacts seen as beneficial to some interest groups could be seen as adverse to other interest groups. For instance, increased emphasis on resource conservation in Alternative B results in a change from the current balance of uses, which could be seen as a beneficial impact by wilderness advocates, but as an adverse impact to those with oil and gas development interests. In the table, high impacts are those resulting in substantial changes to an existing condition in a way that

impacts a large number of people and (or) endures for a long period of time, low impacts are those felt by a limited number of people and for a limited period of time, and medium impacts are intermediate.

Table 4-18. Overall Impacts on Social Conditions in the Casper Planning Area Alternative, Compared to the No Action Alternative

Impact	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Estimated Impact on Population	N/A	Medium Impact (potential reductions focused in oil/gas service areas)	Low Impact	Low Impact	Low Impact
Estimated Impact on Housing and Community Services	N/A	Medium Impact (due to potential population reductions)	Low Impact	Low Impact	Low Impact
Estimated Impact on Custom, Culture, and Social Trends	N/A	Low to Medium Impact (change from recent trends constitute a greater emphasis on resource conservation; increased emphasis on collaborative management and mitigating impacts of future site-specific actions)	Low Impact	Low to Medium Impact (includes revocation of stock driveways with adverse impacts on certain livestock producers)	Low Impact (increased emphasis on collaborative management and mitigating impacts of future site-specific actions)

Source: Based on the analysis of impacts to social conditions, as described in the text.
N/A Not applicable

4.8.2 Economic Conditions

This section addresses the potential for the alternatives to have impacts on economic conditions in the planning area, including direct, indirect, short-term, and long-term impacts. Appendix B identifies laws, executive orders, regulations, policies, and guidance considered in the analysis of economic conditions.

Potential impacts include changes in regional economic output, employment, and earnings, as well as in tax revenues for the local, state, and federal governments. In terms of economic modeling analysis, direct and indirect impacts are assumed to occur simultaneously, even though in reality, these impacts may take time to work their way through the economic sectors in the analysis area. For example, an action to permit gas exploration and production may result in the direct infusion of money into several economic sectors and indirect infusions into related sectors. In economic modeling, these impacts are assumed to occur instantaneously. Moreover, continued direct infusion of money into the planning area's economy created by the decision to lease oil and gas is analyzed over the life of the project, which, in this case, is likely to represent a multiyear period of production. Thus, the analysis is designed to account for the economic activity produced by planning decisions over time. The impacts are estimated on an annual basis through 2020 based on the estimated annual direct impact of the alternatives. For the purpose of this analysis, short-term economic impacts are defined as those that last for 5 years or less, while long-term economic impacts are defined as those that last for more than 5 years.

4.8.2.1 Methods and Assumptions

The Impact Analysis for Planning model (IMPLAN) estimated economic impacts resulting from BLM management actions under the alternatives. IMPLAN is a regional economic model that provides a mathematical accounting of the flow of money, goods, and services through a region's economy. The model provides estimates of how a specific economic activity translates into jobs and income for the region. It includes the "ripple effect" (or "multiplier effect") of changes in sectors that may not be directly impacted by management actions, but are linked to industries directly impacted. In IMPLAN, these ripple effects are termed indirect impacts (for changes in industries that sell inputs to the industries

directly impacted) and induced impacts (for changes in household spending as household income increases or decreases due to the changes in production).

For instance, an increase in oil and gas production implies more money is spent on the maintenance of existing oil and gas equipment and (or) new oil and gas equipment; this, in turn, implies more money is spent in sectors that provide inputs to oil and gas support services or equipment sectors. These production and consumption or "input-output" relationships allow IMPLAN to estimate the indirect and induced impacts based on changes in production that may result from an alternative. Appendix V provides technical assumptions and additional information about the IMPLAN model.

Methods and assumptions used in this analysis include the following:

- Employment, earnings, and output continue to be a driver of economic and population growth in the planning area.
- Economic benefits to the planning area accrue from BLM-influenced activities, such as oil and natural gas development, livestock grazing, and recreation. Economic benefits to the analysis area also accrue from wildlife grazing, to the extent that wildlife grazing contributes to the availability of and demand for recreational activities.
- Indirect and induced benefits due to minerals, livestock grazing, and recreation can reasonably be estimated by the IMPLAN model.
- Recreation-related expenditures by residents occur in the region, but do not represent new money coming into the study area; therefore, the analysis of economic impacts from recreation considers only recreation expenditures of nonresidents in the four-county planning area. To be more specific, there is a multiplier affect associated with nonresident recreation-related spending that inputs new money into the study region. By knowing the amount of additional nonresident recreational spending associated with each management alternative, the total economic impact can be estimated.
- The analysis of direct and indirect impacts associated with oil and gas activity considers only activities on BLM-administered surface and federal mineral estate. The percent of well drilling and production on BLM-administered surface and mineral estate is relatively constant across alternatives A, D, and E (69%) and Alternative C (67%), but is much lower for Alternative B (19%).
- Assuming the current rate of mining in the planning area continues existing coal leases provide sufficient reserves through 2030.
- For livestock grazing, the analysis reflects a "worst-case" assumption that all acres impacted by surface-disturbing actions (from all the sources listed in Appendix M) are lands currently authorized for grazing; thus, the number of acres available for grazing in 2020 is the number of acres currently available, minus acres that are impacted in the long term by surface-disturbing actions. In addition, the analysis of grazing reflects the assumption that surface-disturbing actions occurs at a constant rate over time.

The pace and timing of economic development in the planning area depends on many factors beyond the management actions of BLM, including national and international energy demands, supply, and prices; operator business strategies; production conditions within the planning area; and demand and supply for agricultural products. Because the pace of development in the planning area is unknown, this analysis assumes a relatively constant rate of development; therefore, actual impacts could differ (e.g., there could be boom- and bust-type short-term impacts that differ from long-term impacts) if the rate of development changes substantially.

The IMPLAN production coefficients were modified to reflect the interaction of producing sectors in the planning area. As a result, the calibrated model does a better job of generating multipliers and the subsequent impacts that reflect the interaction between and among the sectors in the planning area compared to a model using unadjusted national coefficients. Specifically, worker productivity in oil and gas production is higher in Wyoming than nationally; more of the hay used for livestock feed is produced within the region, compared with national averages. Key variables used in the IMPLAN model were filled in using data specific to Wyoming, including employment estimates, labor earnings, and total industry output (Taylor 2004).

4.8.2.2 Analysis of Alternatives

Impacts Common to All Alternatives

The focus of the following analysis is on the resource activities most likely to be impacted by land management decisions, including oil, gas, coal, livestock grazing, and recreational activities (including OHV use). The focus of the economic analysis of coal is on production from the Antelope Mine predicted to occur within Converse County. See the Mineral Resources – Coal section earlier in this chapter for impacts of the alternatives on the coal development potential area. Actions from resource programs or constraints (as described in the alternatives) that impact oil, gas, coal, livestock grazing, and recreational activities (e.g., surface-disturbing actions impacting the amount of land available for grazing) are included by implication. Also included by implication are restrictions on ROWs and corridors; the BLM's RFD scenario for oil and gas, which provides estimated numbers of oil and gas wells and production, incorporates the restrictions on ROWs and corridors. Restrictions on new ROWs tend to be a negligible factor in the decision to develop additional oil and gas wells in fields that are already producing, but could be an important factor in a decision to develop a new field.

Economic impacts related to renewable and geothermal energy development are addressed qualitatively. For locatable and salable minerals, the BLM expects to meet market demand by authorizing mining so that the production of these minerals does not vary across the alternatives being considered. The market price of uranium has increased recently, and there has been an increase in stakings for uranium in the planning area. . For more information on minerals, refer to the Mineral Resources – Locatable and Mineral Resources – Salable sections earlier in this chapter.

Changes in economic activity impact federal, state, and local tax revenues. While all sectors analyzed (oil and gas, coal, recreation, and livestock grazing) contribute to tax revenues, the analysis of tax revenue impacts focuses on oil and gas production because almost all the variation in economic activity across the alternatives is in the oil and gas sector.

The focus of the analysis is on regional earnings and output, employment, and tax revenue. The comparison region is also regional (the four-county planning area). Because the exact locations of additional well drilling and certain other surface-disturbing activities are not known at this time, it is difficult to predict impacts on specific grazing allotments or other specific parcels within the planning area. In the case of grazing allotments, the impacts of surface-disturbing actions are expected to occur over a relatively long time (20 years). Coupled with the relatively small impacts on grazing estimated to occur for all alternatives (as described for individual alternatives below), the implication is that impacts on individual allotments will likely be minor.

Alternative A

Impacts on Regional Earnings and Output

Based on the IMPLAN model, regional earnings under Alternative A average $124.7 million per year between 2001 and 2020, and regional output averages $829.0 million per year, due to activities on BLM-

administered lands and federal mineral estate. The net present value of the stream of regional output, discounted at a 7-percent real discount rate (OMB 2002), is $8,404 million over 20 years. Table 4-19 shows sector-level breakouts for earnings and output. In Alternative A, about 50 percent of the earnings due to activities on BLM-administered estate are from oil and gas drilling and production, about 40 percent is from coal production, and the remaining 10 percent is from recreation and grazing. The relative shares of average annual output and net present value of output are similar.

Table 4-19. Average Annual Impacts on Earnings and Output by Sector and Alternative for the Casper Planning Area

Sector	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Impacts on Annual Average Earnings (millions of 2003 $)					
Oil and gas	$61.9	$8.3	$57.2	$61.1	$61.5
Coal	$50.5	$50.5	$50.5	$50.5	$50.5
Grazing	$3.6	$3.7	$3.6	$3.6	$3.6
Recreation	$8.6	$8.8	$8.7	$8.5	$8.6
Aggregate Impacts	$124.7	$71.2	$120.0	$123.8	$124.3
Impacts on Annual Average Output (millions of 2003 $)					
Oil and gas	$614.3	$113.9	$578.4	$609.4	$612.3
Coal	$172.0	$172.0	$172.0	$172.0	$172.0
Grazing	$12.2	$12.2	$12.2	$12.2	$12.2
Recreation	$30.5	$31.0	$30.7	$30.1	$30.5
Aggregate Impacts	$829.0	$329.1	$793.2	$823.6	$826.9
Impacts on Net Present Value of Output Over 20 Years (millions of 2003 $)[1]					
Oil and gas	$6,191	$1,238	$5,860	$6,150	$6,176
Coal	$1,767	$1,767	$1,767	$1,767	$1,767
Grazing	$129	$129	$129	$129	$129
Recreation	$317	$320	$318	$314	$317
Aggregate Impacts	$8,404	$3,455	$8,075	$8,361	$8,388

Source: Calculated using the IMPLAN model, as described in the text.
[1]Net present value from 2001 to 2020, discounted at 7-percent rate (OMB 2002).
IMPLAN Impact Analysis for Planning model

Impacts on Employment

From a methods standpoint, employment impacts should not be considered separately from output impacts because there is a close relationship between the two. Employment can be thought of as a function of the level of economic activity (sales and purchases) among and between sectors.

Based on the IMPLAN model, regional employment under Alternative A averages 3,050 jobs per year[1] between 2001 and 2020 due to activities on BLM-administered lands and federal mineral estate. Table 4-20 provides information on how these jobs break out by sector.

[1] The number of jobs is expressed as "annual job equivalents," where one annual job equivalent (AJE) represents 12 months of employment. For example, one AJE could represent two jobs for 6 months each, or one job for 12 months. AJEs may represent either full-time or part-time jobs.

Table 4-20. Average Annual Impacts on Employment by Sector and Alternative for the Casper Planning Area

Sector	Number of Jobs[1]				
	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Oil and gas	1,621	215	1,498	1,600	1,612
Coal	695	695	695	695	695
Grazing	134	134	134	134	134
Recreation	600	611	604	594	603
Aggregate Impacts	3,050	1,656	2,931	3,023	3,044

Source: Calculated using the IMPLAN model, as described in the text.

[1]Number of jobs is in annual job equivalents (AJE), where one AJE represents 12 months of employment. For instance, one AJE could represent one job for 12 months, or two jobs for 6 months.

IMPLAN Impact Analysis for Planning model

AJE Annual Job Equivalents

Average annual earnings per job differ for each of these sectors. Based on the IMPLAN model, earnings per job (expressed in year 2003 dollars) would average as the following:

- $39,126 for jobs in oil and gas well drilling; $35,090 for jobs in well completion; and $38,666 for jobs in oil and gas production
- Between $66,149 and $72,473 for jobs in coal production
- $28,158 for jobs associated with cattle grazing and $12,975 for jobs associated with sheep grazing
- Between $11,390 and $16,286 for recreation-related jobs.

Impacts on Tax Revenue

Projected tax revenues for Alternative A due to oil and gas production on federal surface averages $50.1 million per year for federal royalties, $24.0 million per year for state severance taxes, and $25.2 million per year for local ad valorem taxes. Because specific well locations are not known at this time, there are insufficient data to apportion the local tax receipts to individual counties. However, it is likely that local taxes are received primarily by Natrona and Converse counties, since that is where most of the oil and gas fields are located. Table 4-21 provides a summary of tax revenues from oil and gas production for the alternatives.

Table 4-21. Estimated Tax Revenues by Alternative for the Casper Planning Area

Tax Type	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Federal mineral royalties	$50.1	$10.2	$47.4	$49.8	$50.0
State severance taxes	$24.0	$4.9	$22.8	$23.9	$24.0
Local ad valorem production taxes	$25.2	$5.1	$23.9	$25.1	$25.2
Total	$99.4	$20.2	$94.1	$98.7	$99.1

Source: Calculated based on the IMPLAN model and state, federal, and local tax rates, as described in the text.

IMPLAN Impact Analysis for Planning model

Alternative B

Impacts on Regional Earnings and Output

Based on the IMPLAN model, regional earnings under Alternative B average $71.2 million between 2001 and 2020 due to activities on BLM-administered lands and federal mineral estate—just over half the amount projected for Alternative A. As Table 4-19 shows, the difference is due entirely to the difference in oil and gas activity; earnings due to coal production are identical, and recreation and livestock grazing earnings are slightly higher under Alternative B than under Alternative A. Regional output averages $329.1 million per year, with a net present value of $3,455 million, due to activities on BLM-administered lands and federal mineral estate, just over half that in Alternative A (Table 4-19).

However, note that production from state and private lands is greater in Alternative B compared to Alternative A. As a result, the decline in federal production under Alternative B is partially offset by the increased production on state and private lands. The Cumulative Impacts section addresses this issue in more detail.

Alternative B is more restrictive in terms of allowing renewable and geothermal energy development compared to Alternative A. However, little or no commercial potential for geothermal energy development exists, so there are no substantive economic impacts associated with restrictions on geothermal development. The amount of wind-energy development in any Alternative is mainly influenced by market conditions and development potential relative to other areas and cannot be predicted quantitatively at this time.

Impacts on Employment

Regional employment under Alternative B averages 1,656 jobs per year between 2001 and 2020 due to activities on BLM-administered lands and federal mineral estate, slightly over half the level predicted for Alternative A (Table 4-20). Average annual earnings per job in Alternative B are identical to those in Alternative A.

Impacts on Tax Revenue

Projected tax revenues from oil and gas production averages $10.2 million per year for federal royalties, $4.9 million per year for state severance taxes, and $5.1 million per year for local ad valorem tax receipts (Table 4-21). These figures represent a decrease of about 80 percent compared to Alternative A. As noted above, the decrease in production from BLM lands under this alternative are offset somewhat by higher production on state and private lands. If the production on state and private lands is taken into account, the decline in state and local tax revenues fall to about 26 percent when compared to Alternative A. Federal oil and gas royalties are still about 80-percent lower than in Alternative A because federal royalties apply only on federal surface.

Federal royalties do not apply on state and private lands or private mineral estate. The reduction in local tax receipts compared to Alternative A primarily impact Natrona and Converse counties.

Alternative C

Impacts on Regional Earnings and Output

Regional earnings under Alternative C average $120.0 million between 2001 and 2020 due to activities on BLM-administered lands and federal mineral estate—slightly less than the amount projected for Alternative A. As Table 4-19 shows, the difference in earnings versus Alternative A is due entirely to the difference in oil and gas activity; earnings due to coal production and livestock grazing are identical, and earnings from recreation are slightly higher under Alternative C than under Alternative A. Regional

output averages $793.2 million per year, with a net present value of $8,075 million over 20 years, due to activities on BLM-administered lands and federal mineral estate (Table 4-19).

Impacts on Employment

Regional employment averages 2,931 jobs per year between 2001 and 2020 due to activities on BLM-administered lands and federal mineral estate (Table 4-20), slightly less than Alternative A. Average annual earnings per job are identical to those in Alternative A.

Impacts on Tax Revenue

Projected tax revenues from oil and gas production average $47.4 million per year for federal royalties, $22.8 million per year for state severance taxes, and $23.9 million per year for local ad valorem tax receipts (Table 4-21). These figures represent a decrease of about 5 percent compared to Alternative A. Local ad valorem tax receipts due to oil and gas production accrue primarily to Natrona and Converse counties because most oil and gas fields are in these counties.

Alternative D

Impacts on Regional Earnings and Output

Regional earnings under Alternative D average $123.8 million between 2001 and 2020 due to activities on BLM-administered lands and federal mineral estate—slightly less than for Alternative A. Compared to Alternative A, this alternative brings slightly less earnings due to oil and gas activity and recreation, but the same amount for coal and grazing (Table 4-19).

Regional output averages $823.6 million per year due to activities on BLM-administered lands and federal mineral estate. The net present value of the stream of output would be $8,361 million over 20 years (Table 4-19).

Alternative D also includes the revocation of land withdrawals for SDWs. Although this action does not impact the number of authorized AUMs, subsequent changes in land use may impact ranchers who drive their livestock between winter and summer ranges along the SDWs. If access to the SDWs is limited, ranchers would have to haul their livestock between seasonal ranges using trucks, which may reduce livestock production (and, therefore, earnings, output, and employment associated with livestock production) if the cost is prohibitive. For ranchers who use the SDWs, the economic impact of revoking the withdrawals for those driveways would be substantial. Due to uncertainty in how these ranchers would react to the revocations, the impact was not modeled using the IMPLAN economic model.

Impacts on Employment

Regional employment averages 3,023 jobs per year between 2001 and 2020 due to activities on BLM-administered lands and federal mineral estate, slightly less than the level predicted for Alternative A (Table 4-20). Average annual earnings per job are identical to those in Alternative A.

Impacts on Tax Revenue

Based on the analysis, projected tax revenues average $49.8 million per year for federal royalties, $23.9 million per year for state severance taxes, and $25.1 million per year for local ad valorem tax receipts (Table 4-21). These figures represent a small decrease (about 0.6%) compared to Alternative A. Most local tax receipts accrue to Natrona and Converse counties because most oil and gas fields are in these counties.

Alternative E (Preferred Alternative)

Impacts on Regional Earnings and Output

Regional earnings under Alternative E average $124.3 million between 2001 and 2020 due to activities on BLM-administered lands and federal mineral estate—slightly less than for Alternative A. This includes a slight decrease in oil and gas earnings, but approximately identical earnings in all other sectors analyzed (Table 4-19). Regional output averages $826.9 million per year, with a net present value of $8,388 million over 20 years due to activities on BLM-administered lands and federal mineral estate (Table 4-19).

Impacts on Employment

Regional employment averages 3,044 jobs per year between 2001 and 2020 due to activities on BLM-administered lands and federal mineral estate, which is almost exactly the same level as is predicted for Alternative A (Table 4-20). Average annual earnings per job are identical to those in Alternative A.

Impacts on Tax Revenue

Projected tax revenues average $50.0 million per year for federal royalties, $24.0 million per year for state severance taxes, and $25.2 million per year for local ad valorem tax receipts (Table 4-21). These figures represent a small decrease (about 0.3%) compared to Alternative A.

4.8.2.3 Conclusion

Overall, earnings, output, employment, and tax revenues due to activities on BLM-administered land and federal mineral estate are lowest under Alternative B, greatest under Alternative A, and intermediate under alternatives C, D, and E. Differences in projected oil and gas activity are the primary reason for the overall differences in earnings, jobs, and output.

The difference in earnings and employment projected to result from the different alternatives represents a small proportion of total earnings and employment in the socioeconomic analysis area in 2000. To see this, note that the annual average earnings associated with activities on BLM-administered surface and mineral estate range from $71.2 million under Alternative B to $124.7 million under Alternative A. The difference, $53.5 million, represents just 1.6 percent of personal income in the planning area in 2003, based on total income of $3,347 million (BEA 2005; reported in the Economic Conditions section of Chapter 3). This represents a relatively minor portion of overall income. The difference in average annual labor earnings between alternatives E and A ($0.3 million) represents about 0.01 percent of total income in 2003; the difference between alternatives D and A ($0.9 million) represents about 0.03 percent of income in 2003; and the difference between alternatives C and A ($4.6 million) represents just 0.1 percent of total earnings in 2003.

The differences in employment also are small compared to total employment in the planning area. For example, the number of annual job equivalents associated with activities on BLM-administered lands and federal mineral estate ranges from 1,656 in Alternative B to 3,050 in Alternative A, a difference of 1,394. This difference represents about 2.1 percent of the total employment in the socioeconomic planning area in 2003 (66,145 people) (BEA 2005; reported in the Economic Conditions section of Chapter 3). The differences are much smaller between alternatives A and C (Alternative C results in a decline of 119 annual job equivalents, which is 0.2% of 66,145), alternatives A and D (Alternative D results in a decline of 27 annual job equivalents, which is about 0.04% of 66,145), or alternatives A and E (Alternative E results in a decline of about 6 annual job equivalents, which is about 0.01% of 66,145). Thus, although BLM management decisions impact the local economy, other activities not on BLM-administered land and federal mineral estate have also substantial influence on regional earnings, output, employment, and tax revenues.

4.8.3 Health and Safety

Health and safety, as discussed in this document, includes AMLs, FUDS, and hazardous materials and wastes. Each of these hazards is analyzed below in a separate section.

Health and Safety – Abandoned Mine Lands

To reduce the threat of physical and environmental impacts from AML sites, the Casper Field Office will remediate sites based on risk.

4.8.3.1 Methods and Assumptions

The methods and assumptions used in this impact analysis include the following:

- AML sites in the planning area are identified and characterized.
- "The BLM will set as its highest AML physical safety action priority the cleaning up of those AML sites situated at locations: (a) where a death or injury has occurred and the site has not already been addressed; or (b) situated on or in immediate with high visitor use" (BLM 2000d). Under the Clean Water Action Plan, AML sites adversely impacting watersheds are also a high priority. The BLM continues to support the Wyoming Department of Environmental Quality Abandoned Mine Lands (DEQAML) Division in reclaiming AML sites on public surface.

4.8.3.2 Analysis of Alternatives

Impacts Common to all Alternatives

The alternatives described in Chapter 2 are not expected to create new AML sites or increase risks at AML sites.

In cooperation with the DEQAML, the BLM will remediate AML sites posing a substantial risk to human health and the environment. Risk reduction will also occur through educating the public about the hazards associated with abandoned mines using publications, signage, web sites, and other educational materials.

No projected adverse impacts to AML sites in the planning area exist.

4.8.3.3 Conclusion

No differences in impacts to AML sites occur among the alternatives. An active reclamation program is established to incorporate cleanup and reduce hazards and will remain in place for all alternatives.

Health and Safety – Formerly Used Defense Sites

The presence of FUDS in the planning area is considered a direct adverse impact. Actions that create risks of FUDS to human health, or that avoid, reduce, or prohibit FUDS management activities in the planning area, are considered adverse impacts. Conversely, beneficial impacts to FUDS comprise activities that minimize, reduce, or prevent the creation or impact of FUDS in the planning area.

4.8.3.4 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Cleanup at FUDS is the responsibility of the U.S. Army Corps of Engineers (USACE).
- The discovery of unexploded munitions will be responded to as an emergency response.

4.8.3.5 Analysis of Alternatives

Impacts Common to All Alternatives

Under all alternatives, cleanup of FUDS remains the responsibility of USACE. The BLM cooperates with all USACE cleanup activities, including providing personnel support, as necessary. No new FUDS exist, so the analysis focuses on risk reduction at existing FUDS. No substantive indirect impacts relate to risks at FUDS exist either. Refer to Map 67 for FUDS locations within the planning area.

Alternative A

Alternative A has a direct beneficial impact by reducing risks at FUDS through restricting use of the land and by requiring a safety plan.

Alternative B

Alternative B has a greater beneficial impact than Alternative A and the greatest beneficial impact of all alternatives on FUDS by reducing all risks through closing or restricting all lands listed as FUDS.

Alternative C

Alternative C has less beneficial impacts than Alternative B, but has greater beneficial impacts than Alternative A by reducing risks through closing or restricting use at FUDS until the risk is minimized.

Alternative D

Alternative D allows acceptable land uses and public access in FUDS. Alternative D has less beneficial impacts than Alternative B, but greater beneficial impacts than alternatives A, C, or E.

Alternative E (Preferred Alternative)

Alternative E has the least beneficial impacts on FUDS because it places the fewest restrictions on commercial use and no restrictions on public use.

4.8.3.6 Conclusion

Beneficial impacts to FUDS occur under all alternatives; however, Alternative B could have the greatest beneficial impacts and Alternative E could have the least beneficial impacts. Under all alternatives, FUDS remain the responsibility of the USACE.

Health and Safety – Hazardous Materials and Waste

With increased recreational and commercial use of public surface in the planning area comes an inherent risk associated with an increase in the amount of hazardous materials generated, used, transported, and stored.

4.8.3.7 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- All new hazardous materials and waste sites are identified and characterized.
- Resource development activities identify any possible generation of hazardous waste.
- No substantial new hazardous materials uses and (or) waste generation occurs within the planning area.

- The BLM's Hazard Management and Resource Restoration Program (HMRRP) responds to all hazardous material releases on public surface. Emergency cleanup actions are implemented on sites posing a substantial threat to the public and (or) the environment.

4.8.3.8 Analysis of Alternatives

Impacts Common to all Alternatives

The impacts to hazardous materials are the same among all alternatives. Implementing hazardous materials management activities will address human health and environmental risks from hazardous materials. Any authorized use of hazardous materials adheres to federal and state requirements to reduce or eliminate impacts. Hazardous materials in the planning area are managed to reduce risks to visitors and employees, to restore contaminated lands, and to carry out emergency response activities, as per appropriate laws, policies, and regulations. Substantive indirect impacts related to risks from hazardous materials during remediation could exist.

4.8.3.9 Conclusion

Under all alternatives, the risks from hazardous materials and waste are the same. An active remediation program remains in place under all alternatives. Hazardous materials in the planning area are managed to reduce risk to people and the environment.

4.8.4 Environmental Justice

This section addresses the potential for the alternatives to have disproportionate adverse impacts on minority and low-income populations, including direct, indirect, short-term, and long-term impacts. Appendix B identifies laws, regulations, policies, and guidance considered in the analysis of disproportionate adverse impacts.

Because the analysis of disproportionate adverse impacts depends on what impacts are identified related to other resources, definitions of adverse impacts as they apply to environmental justice issues are closely related to the definitions of adverse impacts in other resource areas (e.g., social resources). For example, displacing a mobile home park that houses a low-income population to build a new road could be a disproportionate direct impact. An example of a disproportionate indirect impact could be a reduction in social services to low-income individuals from decreased tax revenues as a result of decreased mineral production.

4.8.4.1 Methods and Assumptions

Since the analysis of disproportionate adverse impacts is based on other resource impacts, the assumptions for this analysis also are based on the assumptions of other resource areas as they relate to the identification and analysis of impacts. In addition, this analysis assumes that if demographic data show that there are concentrations of minority and low-income populations in the planning area, then the adverse impacts on other resources need to be identified and evaluated to determine if there could be disproportionate adverse impacts.

In accordance with the BLM and CEQ guidance for assessing environmental justice in the planning process, an area is considered to contain a minority population if either the minority population of the impacted area exceeds 50 percent or the percentage of minority population in the impacted area is meaningfully greater than the percentage in the general population. Since the minority population in each of the four counties that overlap the planning area is lower than the statewide minority population, and the minority population in each of the four counties does not exceed 50 percent, none of these areas is considered to contain a resident minority population. Based on the BLM and CEQ guidance relating to

identifying low-income populations, there are no low-income populations living in poverty in the planning area.

Although there are no Native American reservations in the planning area, the Wind River Indian Reservation is 30 miles west of the western boundary of the planning area. The Cedar Ridge site and other sites have cultural significance to members of tribes living in the area; the cultural significance of these sites is addressed in the Cultural Resources section of this chapter.

4.8.4.2 Analysis of Alternatives

Based on the definitions, methods, and assumptions described above, potential impacts of the alternatives are described below.

Impacts Common to All Alternatives

Based on demographic conditions in the planning area and the direct and indirect impacts of the alternatives, there are no identifiable environmental justice issues or direct or indirect impacts associated with any of the alternatives specific to any minority or low-income community or population as defined in Executive Order 12898 or BLM IM 2002-164. While minority and low-income populations exist in the planning area, no particular BLM actions proposed in any of the alternatives are identified as causing disproportionate adverse impacts on these populations. The BLM has considered input from persons regardless of their race, ethnicity, income status, or other social and economic characteristics.

4.8.4.3 Conclusion

The alternatives are identical with respect to potential impacts on minority and low-income populations. No particular BLM actions proposed in any of the alternatives could cause disproportionate adverse impacts on minority or low-income populations. The BLM has considered input from persons regardless of their race, ethnicity, income status, or other social and economic characteristics.

4.8.5 Tribal Treaty Rights

Impacts to tribal treaty rights and trust responsibilities include, but are not limited to, limitations on access to tribal hunting, fishing, or resource collection areas reserved by treaty, economic issues, and other resource use and access issues. Impacts are identified in consultation with the appropriate tribal groups.

The Casper Field Office coordinates and consults regularly with appropriate American Indian groups to identify and consider their concerns in BLM land use planning and decisionmaking. Interested tribes review proposed land use planning decisions and other major BLM decisions for consistency with tribal land use and resource allocation plans; however, no treaty rights pertain directly to BLM-administered lands within the planning area.

Because no tribal treaty rights or trust responsibilities are known within or mandated by the Casper Field Office, management actions on the part of the BLM will have no impact on such rights. Each alternative has measures to protect cultural resources, including those related to traditional uses and practices. These are discussed and analyzed in the Cultural Resources section.

4.9 Cumulative Impacts

The CEQ defines cumulative effects as

> *The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR 1508.7).*

The following narrative describes the three components of this definition as they relate to this cumulative impact analysis: (1) incremental impact of the action when added to (2) impacts from all past, present, and (3) reasonably foreseeable future actions.

The first component, incremental impacts of the action (i.e., RMP revision), is described for each resource under the eight resource topics in Sections 4.1 to 4.8 as direct, indirect, short-term, and long-term. The second component, impacts from all past and present actions, is encompassed within the description of baseline conditions presented in Chapter 3 – Affected Environment. In other words, the description of the current affected environment reflects past and present actions. The third component, reasonably foreseeable future actions, are identified in Table 4-22 and in Appendix M.

Table 4-22 identifies 19 projects anticipated to involve reasonably foreseeable future actions in or adjacent to the planning area. Sixteen of the projects in Table 4-22 are land use plans or other types of programmatic documents that provide a framework for subsequent site-specific actions. The breakdown of these 16 projects by agency includes 5 BLM RMPs, 1 BLM Programmatic Wind-Energy EIS, 2 USFS Land and Resource Management Plans, 2 USFWS Plans, 1 NPS General Management Plan, 4 County Land Use Plans, and 1 Wyoming State Transportation Plan. The remaining three projects include two site-specific projects and a BLM IM.

The analysis of cumulative impacts serves to place the projected incremental impacts from the RMP alternatives in the context of past, present, and future impacts. Combining the projected impacts of RMP alternatives with past, present, and future impacts necessarily involves projections and limited analyses. Analyses are limited primarily due to incomplete documentation of all past and present impacts on private and public lands; challenges of predicting potential impacts for reasonably foreseeable future actions; programmatic and strategic nature of RMP alternatives; unknown nature and pace of resource uses and technological changes that could occur; and changing circumstances related to agency priorities, policies, and the economy. These limitations are addressed through the methods and assumptions described in the following section.

Methods and Assumptions

It is neither practical nor required to exhaustively analyze all possible cumulative impacts. Instead, CEQ (1997) indicates the cumulative impact analysis should focus on meaningful impacts. The BLM identified key planning issues (see Chapter 1) to focus the analysis of environmental consequences in Sections 4.1 to 4.8 on meaningful impacts. During the analysis of environmental consequences, the key planning issues were further refined to seven cumulative issues for discussion in this section. Cumulative issues were identified based on scoping input, reasonably foreseeable future actions, professional judgment, purpose and need of the action, planning criteria, and consideration of context and intensity of potential impacts. Particular attention was given to potential impacts to public health and safety, controversy, uniqueness of resources, potential for violation of legal standards or laws, and potential impacts to legally protected resources. To focus the scope of cumulative impact analyses, cumulative issues were considered in the context of baseline conditions (Chapter 3), the incremental impacts of

individual resources (Sections 4.1 to 4.8), reasonably foreseeable future projects in Table 4-22, and the following factors (as modified from CEQ 1997):

- Does the impacted resource have substantial value relative to legal protection and (or) ecological, cultural, economic, or social importance?
- Are reasonably foreseeable future actions anticipated to have environmental impacts similar to the incremental impacts identified for RMP alternatives?
- Have any recent or ongoing NEPA analyses of similar actions in the geographic area identified important adverse or beneficial cumulative impact issues?
- Has the impact to the resource been historically significant, such that the importance of the resource is defined by past loss, past gain, or investments to restore resources?

The cumulative impact analysis was further bounded by timeframe, geographic area, and analytical assumptions. The timeframe or temporal limits of the cumulative impact analysis was defined as the anticipated life of the RMP. This timeframe corresponds to projections for the desired outcomes (goals and objectives) described for alternatives (Chapter 2). The geographic area or spatial limits of the cumulative impacts analysis was generally defined as the planning area; however, the impact analysis area was expanded for highly mobile resources, such as air quality, and for future actions adjacent to the planning area anticipated to have similar environmental impacts.

The majority of projects identified in Table 4-22 are ongoing and generally provide a management framework for site-specific actions implemented during the life of the various projects. Site-specific actions that have already occurred (past) or are ongoing (present) are not considered in this cumulative impacts analysis. Instead, these past and present actions are described in the baseline described in Chapter 3 – Affected Environment. Only those reasonably foreseeable future actions stemming from the 19 projects identified in Table 4-22 and Appendix M are considered in this cumulative impacts analysis (CEQ 2005).

Because most of the projects identified in Table 4-22 are programmatic and (or) strategic in nature, the precise intensity or location of anticipated impacts typically cannot be quantified. Therefore, the projects in Table 4-22 are primarily used to address the four factors identified above. For more quantitative analysis, the BLM projected the anticipated surface disturbance and air emissions from non-BLM RFAs for the entire planning area (Appendix M). The estimates of RFAs in Appendix M are based on historic and trend information, as well as the proportion of public to nonpublic land in the planning area. In addition to estimating RFAs for BLM and non-BLM actions, Appendix M also projects surface disturbance as short-term and long-term. Long-term surface disturbance denotes the disturbed area remaining following reclamation. Table 4-23 summarizes projected surface disturbance for BLM and non-BLM RFAs identified in Appendix M.

In general, trend analysis was used to assess cumulative impacts for identified issues in terms of ranges or changes in direction from baseline conditions. In lieu of quantitative data, projections regarding resource values were made when necessary. For example, approximately 5 percent of the soils in the entire planning area exhibit a high potential for water erosion and 4 percent of the soils have a high potential for wind erosion. These percentages were assumed to apply to both public and private lands across the planning area, regardless of ownership.

Table 4-22. Summary of Reasonably Foreseeable Future Actions

Present and Reasonably Foreseeable Future Actions and Management Plans	Programmatic Project	Air	Soil	Water	Minerals	Fire	Vegetation	Fish	Wildlife	Special Status Species	Heritage	Lands and Realty	Renewable Energy	Transportation	Off-Highway Vehicles	Livestock Grazing	Recreation	Visual Resource Management
Approved Resource Management Plan for Public Lands Administered by the Bureau of Land Management Buffalo Field Office FEIS (BLM 2001a)	x	x	x	x	x	x	x	–	x	x	x	x	–	–	–	x	x	x
Lander Resource Management Plan FEIS (BLM 1986b). *Lander Grazing Supplement 1986.*	x	–	x	x	–	–	x	x	x	–	x	–	–	–	–	x	x	–
Newcastle Resource Management Plan EIS (BLM 2000b)	x	x	x	x	x	x	x	–	x	x	x	x	–	–	–	x	x	x
Rawlins Resource Management Plan and DEIS (BLM 2004f)	x	x	–	x	x	x	x	x	x	x	x	x	–	x	x	x	x	x
Washakie Resource Management Plan DEIS (BLM 1988a)	x	x	x	x	x	x	x	x	x	x	x	x	–	–	x	x	x	x
Final Programmatic EIS on Wind Energy Development on BLM-Administered Lands in the Western United States (BLM 2005h)	x	x	x	x	–	–	x	x	x	x	x	x	x	–	–	–	–	x
Medicine Bow National Forest Final EIS for the Revised Land and Resource Management Plan (USFS 2003b)	x	x	x	x	x	x	x	x	x	–	x	x	–	x	–	x	x	x
Land and Resource Management Plan for the Thunder Basin National Grassland. Medicine Bow-Routt National Forest. Rocky Mountain Region (USFS 2001)	x	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Pathfinder Reservoir Area Management Plan (USBR 1982)	x	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Platte River Recovery Implementation Program DEIS (USBR and USFWS 2003)	x	–	–	x	–	–	–	x	x	x	x	x	x	–	x	–	x	–
Final EIS, General Management Plan, Development Concept Plan, Interpretive Prospectus for the Fort Laramie National Historic Site (BLM 1993)	x	x	x	x	–	x	x	–	x	x	x	x	–	x	–	–	–	x
Converse County Land Use Plan. Converse County Planning Commission (2003)	x	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Land Use Plan. Natrona County, Wyoming, Natrona County Planning and Zoning Commission (1998)	x	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Casper Mountain Plan, Casper Mountain Steering Committee and Natrona County Planning Department (1985)	x	–	x	x	x	x	x	–	x	x	x	x	–	x	x	–	x	–
Land Use Plan. Goshen County, Wyoming, Goshen Association of Governments (1977)	x	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table 4-22. Summary of Reasonably Foreseeable Future Actions (Continued)

Present and Reasonably Foreseeable Future Actions and Management Plans	Programmatic Project	Air	Soil	Water	Minerals	Fire	Vegetation	Fish	Wildlife	Special Status Species	Heritage	Lands and Realty	Renewable Energy	Transportation	Off-Highway Vehicles	Livestock Grazing	Recreation	Visual Resource Management
Wyoming Department of Transportation Fiscal Year 2005 State Transportation Improvement Summary (WYDOT 2004)	x	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Final EIS and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project (BLM 2003f)	–	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
South Powder River Basin Coal FEIS (BLM 2003f)	–	x	x	x	x	–	x	–	x	x	x	x	–	x	–	x	x	x
BLM Instruction Memorandum No. 2001-102, Grasshopper and Mormon Cricket Control Program Changes (BLM 2001e)	x	–	–	–	–	–	–	–	x	x	–	–	–	–	–	–	–	–

Note: Full citations for each project are in Chapter 5 – References.

X	adverse impact or beneficial impact	FEIS	Final Environmental Impact Statement
–	No specific impacts identified for this resource	WYDOT	Wyoming Department of Transportation
BLM	Bureau of Land Management	USFS	U.S. Forest Service
DEIS	Draft Environmental Impact Statement	USFWS	U.S. Fish and Wildlife Service
EIS	Environmental Impact Statement		

Because BLM does not manage or regulate non-BLM actions, certain assumptions were made in estimating cumulative impacts for non-BLM actions. Assumptions used in calculating impacts from non-BLM actions within the planning area follow.

1. For cumulative impacts associated with non-BLM oil and gas activities, calculations were based on the following percent federal and non-federal wells from Wyoming Reservoir Management Group's Oil and Gas Reasonable Foreseeable Development (BLM 2005f):
   - Baseline – 71 percent federal and 29 percent nonfederal
   - Alternative A – 69 percent federal and 31 percent nonfederal
   - Alternative B – 19 percent federal and 81 percent nonfederal
   - Alternative C – 67 percent federal and 33 percent nonfederal
   - Alternative D – 69 percent federal and 31 percent nonfederal
   - Alternative E – 69 percent federal and 31 percent nonfederal
2. For cumulative impacts associated with non-BLM coal development, calculations were based on actual mineral ownership within the CDPA: 92 percent BLM-administered minerals and 8 percent non-BLM-administered minerals.
3. For cumulative impacts associated with non-BLM other activities (excluding oil, gas, and coal) the amount and density of activities was assumed the same for BLM and non-BLM actions, regardless of land ownership. The calculation of cumulative impacts for non-BLM other mineral actions (i.e., non-oil and gas) is based on 55-percent BLM-minerals and 45-percent non-BLM minerals in the planning area. The calculation of cumulative impacts for non-BLM other activities (i.e., nonmineral) is based on 16-percent BLM-administered surface and 84-percent non-BLM-administered surface in the planning area.

4. The context and intensity of non-BLM activities are not anticipated to vary by alternative because these activities do not directly depend on management actions and allowable uses set forth in RMP alternatives.

Table 4-23. Cumulative Surface Disturbance from BLM and Non-BLM Reasonable Foreseeable Actions over the Life of the Plan in the Casper Planning Area

Action	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Total Acres Short-Term Disturbance from BLM Actions	59,990	36,650	58,689	63,649	61,274
Total Acres Reclaimed from BLM Actions	38,903	25,085	38,331	41,569	39,602
Total Acres Long-Term Disturbance from BLM Actions	**21,087**	**11,565**	**20,358**	**22,080**	**21,672**
Total Acres Short-Term Disturbance from Non-BLM Actions	189,649	189,649	189,649	189,649	189,649
Total Acres Reclaimed from Non-BLM Actions	149,224	149,224	149,224	149,224	149,224
Total Acres Long-Term Disturbance from Non-BLM Actions	**40,425**	**40,425**	**40,425**	**40,425**	**40,425**
Cumulative Long-Term Acres from Disturbance	**61,512**	**51,990**	**60,783**	**62,505**	**62,097**

Source: Appendix M of this document, Table M-1
BLM Bureau of Land Management

Cumulative Impacts

Eleven of the projects identified in Table 4-22 documented their anticipated impacts in an EIS. Review of the EISs and associated plans for the 19 projects revealed that most reasonably foreseeable future actions from the projects could be expected to produce environmental impacts similar to the incremental impacts anticipated for the RMP alternatives. For example, when implemented, most projects in Table 4-22 are anticipated to involve surface-disturbing activities or will allow removal of vegetation and soil disturbance, similar to actions anticipated for RMP alternatives. Therefore, cumulative impacts, such as soil erosion, spread of INPS, and habitat fragmentation, are anticipated to be commensurate with the amount of surface disturbance projected within the planning area.

Some resources (i.e., cultural, special status species, air quality) that could be impacted by reasonably foreseeable future actions have substantial value relative to legal protection and (or) ecological, cultural, economic, or social importance. Exceedance of legal standards or thresholds protecting these resources is not anticipated from the cumulative impact of BLM and non-BLM actions; however, the programmatic nature of most RFAs prohibits precise prediction of cumulative impacts. Subsequent environmental impact analysis in implementation plans include more precise site- and project-specific information.

The following cumulative impacts discussion is organized according to the seven cumulative issues identified by the BLM to focus the cumulative impact analysis. Each issue is discussed in terms of the potential cumulative impact of BLM actions anticipated through implementing the revised plan and non-BLM actions anticipated to occur during the life of the plan.

Cumulative Issue 1 – The cumulative impact of surface-disturbing activities and the associated potential invasion and spread of INPS

The INPS section in this chapter describes how surface-disturbing activities and the disturbance of soil contribute to the spread of INPS. The Soil section describes potential impacts to soil from surface-disturbing activities and other activities that remove vegetation and disturb soil. RFAs that disturb soil are also anticipated to create potential habitats for INPS. In general, the more soil disturbed over the life of the plan, the greater the cumulative impact anticipated relative to INPS. Surface disturbance from non-BLM actions is anticipated to be substantively greater than surface disturbance from BLM actions. For example, the Powder River Basin Oil and Gas Project, adjacent to the Casper planning area, addresses management of more than 95,000 acres of long-term surface disturbance in the Powder River Basin (BLM 2003f). While much of the area projected to be disturbed from BLM and non-BLM actions is anticipated to be reclaimed, the potential for the spread of INPS remains from both short- and long-term impacts (Table 4-23).

In addition to total acres of land disturbed, the type of disturbance is important to the spread of INPS. For example, construction, maintenance, existence, and operation of linear features (e.g., water courses, roads, trails, ROWs, and corridors) in the planning area could have a substantive impact on the spread of INPS. Water, wind, vehicles, livestock, humans, and wildlife inadvertently transport INPS along these linear features. Similar to surface disturbance, the greater the miles of linear features constructed, the greater the adverse cumulative impact from INPS.

Surface-disturbing activities are defined as the physical disturbance and movement or removal of the land surface and vegetation (see Glossary). In addition to surface-disturbing activities other surface-use activities may remove vegetation and disturb soil. OHV use, fire suppression, recreational activities, and dispersed travel may remove vegetation and disturb the soil surface. Improper grazing by livestock and native ungulates can reduce vegetative cover, exposing more soil to erosion. Surface-disturbing activities and surface uses can contribute to the spread of INPS.

Table 4-24 categorizes projected disturbance in the planning area for BLM and non-BLM actions by soils with a high water and high wind-erosion potentials. Management actions associated with each alternative (see Chapter 2) afford some degree of reclamation following surface disturbance and some degree of protection of highly erodible soils or soils occurring on slopes exceeding 25 percent for BLM-managed lands. However, because of how they are formulated, these protective measures are anticipated to be more effective under some alternatives (e.g., Alternative B) and less effective under other alternatives (e.g., Alternative D). These protective measures may not apply to lands under state and fee (i.e., private) ownership. Moreover, protective measures may be applied unevenly across the planning area and enforcement and monitoring of protective measures depend on land ownership and funding. Some private lands are subject to local protective measures; however, the nature and extent of these measures are expected to vary for private lands within the planning area. For example, the Casper Mountain Land Use Plan (Worthington et al. 2004) limits mineral development and recreational uses on steep slopes that provide some measure of protection to erosive soils. In addition, the Natrona County Land Use Plan ensures that future development will not adversely impact adjacent land uses. However, similar restrictions are not identified for all non-BLM RFAs.

Similar to the impact analysis described in the INPS section, Tables 4-23 and 4-24 support the conclusion that cumulative surface disturbance acreage is anticipated to be the most under Alternative D and the least under Alternative B for the entire planning area. Likewise, due to management actions and restrictions, INPS spread associated with nonsurface-disturbing activities (i.e., livestock and native ungulate grazing, OHV use, fire, recreational activities, and dispersed travel) are anticipated to be the most under Alternative D and the least under Alternative B for lands managed by the BLM. Considering BLM and

non-BLM actions, projected surface disturbance, nonsurface-disturbing activities, and management actions for the other three alternatives, the projected INPS cumulative impacts in the planning area are anticipated to be similar under alternatives A, C, and E.

Table 4-24. Cumulative Reasonable Foreseeable Actions for Surface Disturbance in the Casper Planning Area

Action	Alternative A		Alternative B		Alternative C		Alternative D		Alternative E	
Cumulative Disturbance										
Total Acres Short-Term Disturbance from BLM Actions	59,990		36,650		58,689		63,649		61,274	
Total Acres Reclaimed from BLM Actions	38,903		25,085		38,331		41,569		39,602	
Total Acres Long-Term Disturbance from BLM Actions	21,087		11,565		20,358		22,080		21,672	
Potential Impact to Highly Erosive Soils (acres) from BLM Actions	**Water**	**Wind**	**Water**	**Wind**	**Water**	**Wind**	**Water**	**Wind**	**Water**	**Wind**
	1,054	**843**	**0**	**0**	**1,018**	**814**	**1,104**	**883**	**1,084**	**867**
Total Acres Short-Term Disturbance from Non-BLM Actions	189,649		189,649		189,649		189,649		189,649	
Total Acres Reclaimed from Non-BLM Actions	149,224		149,224		149,224		149,224		149,224	
Total Acres Long-Term Disturbance from Non-BLM Actions	40,425		40,425		40,425		40,425		40,425	
Potential impact to Highly Erosive Soils (acres) from Non-BLM Actions	**Water**	**Wind**	**Water**	**Wind**	**Water**	**Wind**	**Water**	**Wind**	**Water**	**Wind**
	2,021	**1,617**	**2,021**	**1,617**	**2,021**	**1,617**	**2,021**	**1,617**	**2,021**	**1,617**
Cumulative Long-Term Acres of Disturbance	**61,512**		**51,990**		**60,783**		**62,505**		**62,097**	
Potential Impact to Highly Erosive Soils (acres) from All Actions	**Water**	**Wind**	**Water**	**Wind**	**Water**	**Wind**	**Water**	**Wind**	**Water**	**Wind**
	3,075	**2,460**	**2,021**	**1,617**	**3,039**	**2,431**	**3,125**	**2,500**	**3,105**	**2,484**

Assumptions for non-BLM actions:

Calculations for non-BLM actions assume an equal amount of development will occur on BLM surface (16% = 1,361,225 acres) as non-BLM surface (84% = 7,160,122 acres), and on BLM-administered minerals (55% = 4,656,035 acres) as non-BLM-administered minerals (45% = 3,865,312 acres) over the life of the plan.

Calculations assume percentages of water (5%) and wind (4%) erosion apply to the entire planning area, regardless of ownership.

Used the above ratios to calculate the acres of surface disturbance.

BLM Bureau of Land Management

Cooperation between the Natrona, Converse, Platte, and Goshen County Weed and Pest Control Districts and the BLM is anticipated to continue throughout the life of this plan; however, the long-term effectiveness of INPS control measures on all public and private lands in the planning area depends on continued cooperation, available funding, agency priorities, and the effectiveness and periodic assessment of weed-management activities in accordance with a comprehensive weed-management plan. Unchecked INPS could overwhelm attempts at control and substantially impact fire management and ecology, biological resources, livestock grazing (by reducing rangeland productivity and AUMs, and recreation (by impacting wildlife habitats and scenic quality) throughout the planning area.

Cumulative Issue 2 – The cumulative impact of management actions and constraints on oil and gas development

The unconstrained RFD projection over the life of the plan is 2,800 new wells (75-percent conventional wells and 25-percent CBNG wells) in the planning area (BLM 2005f). During the RMP alternative formulation process, management actions and allowable uses were identified for individual resource programs, which spatially and temporally constrained and, thus, impacted mineral development. Constraints included deferring leasing, CSU restrictions, TLS, and stipulations on conditions of approval for application to drill. These constraints reduce the unconstrained estimated number of well locations, and, in general, increase development costs and reduce production in areas of federal oil and gas ownership.

The constraints identified above are not applied to nonfederal (state and fee minerals) wells. While other constraints may be applied to nonfederal wells, the impact of such constraints cannot be quantified for this analysis. The number of unconstrained baseline wells, constrained federal wells, and unconstrained nonfederal wells projected for each alternative over the life of the plan are summarized in Table 4-25.

The projected number of new nonfederal wells (685) is approximately 24 percent of the cumulative number of new wells (2,800) predicted for the planning area between 2001 and 2020. Restrictions placed on federal wells under the various alternatives reduce the number of new wells compared to the unconstrained baseline of 2,800 wells, as follows.

Percent reduction from baseline projected unconstrained new wells:

- Alternative A – 6 percent
- Alternative B – 63 percent
- Alternative C – 11 percent
- Alternative D – 7 percent
- Alternative E – 6 percent

The cumulative impact of federal and nonfederal wells on surface disturbance and INPS, special status species, cultural resources, and social and economic conditions are described under the appropriate cumulative issue in this section.

Table 4-25. Reasonable Foreseeable Development Well Number Projections

Well Type	Baseline	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E *(Preferred Alternative)*
Number of Projected New Federal Wells	1,988	1,823	190	1,664	1,800	1,813
Projected Number of Abandoned New Federal Wells	322	284	26	259	279	281
Projected Productive New Federal Wells	**1676**	**1,539**	**164**	**1,405**	**1,521**	**1,532**
Number of Projected New Nonfederal Wells	812	819	808	819	809	815
Projected Number of Abandoned New Nonfederal Wells	127	128	109	127	126	127
Projected Productive New Nonfederal Wells	**685**	**691**	**699**	**692**	**683**	**688**
Cumulative New Wells (Federal/Nonfederal)	2,800	2,642	998	2,483	2,609	2,628
Cumulative Abandoned New Wells (Federal/Nonfederal)	439	412	135	386	405	408
Cumulative Productive New Wells (Federal/Nonfederal)	**2,361**	**2,230**	**863**	**2,097**	**2,204**	**2,220**

Cumulative Issue 3 – The cumulative impact of water depletion on downstream special status species

Anticipated water depletions from BLM actions and the potential impacts to special status species are described in the Fish and Wildlife Resources – Fish, Special Status Species – Fish, and Water sections of this chapter. Water depletions from BLM actions are anticipated from development of oil and gas wells, fish and wildlife water sources, and livestock water sources. Water depletions from non-BLM actions also are anticipated from the development of oil and gas wells and livestock water sources, and are not expected to substantively vary by alternative. Developing of fish and wildlife water sources on private lands within the planning area not administered by BLM are not anticipated. Table 4-26 shows the projected average annual water depletion from BLM and non-BLM actions within the planning area.

Table 4-26. Projected Cumulative Annual Water Depletion from BLM and Non-BLM Actions over the Life of the Plan

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E *(Preferred Alternative)*
Projected Average Annual Depletion from BLM Actions (acre-feet)	79	2,014	1,054	272	270
Projected Average Annual Depletion from Non-BLM Actions (acre-feet)	462	462	462	462	462
Projected Cumulative Annual Depletion from BLM and Non-BLM Actions in the Planning Area (acre-feet)	541	2,476	1,516	734	732

BLM Bureau of Land Management

Table 4-26 does not include predictions of water depletions associated with urban development within the planning area. As population centers within the Platte River System grow and larger tracts of land are subdivided into smaller, more numerous residential properties, water depletions within the North Platte watershed are expected to increase irrespective of BLM-actions.

In 2002, the USFWS issued a revised intra-Service biological opinion and conference opinion regarding federal actions that individually deplete 25 acre-feet or less to the Platte River System (USFWS 1996). Individual projects that deplete less than 25 acre-feet are considered minor depletions. Individual projects that deplete more than 25 acre-feet are considered major depletions and require consultation. Cumulatively, all BLM and non-BLM actions over the life of the plan are anticipated to deplete more than 25 acre-feet of water in the Platte River System over the life of the plan (Table 4-26), but none of the proposed actions individually would exceed 25 acre-feet.

Regarding federal actions, USFWS (2002) indicates that most of the more than 1,000 proposed federal actions within the Platte River System are anticipated to involve water depletions. The USFWS and USBR are currently addressing the issue of water depletion in the Platte River System through preparation of the Platte River Recovery Implementation Program EIS (USBR and USFWS 2003). The cumulative impact of water depletions within the Platte River System to special status species downstream in the Platte River is well documented (USBR and USFWS 2003) and expected to continue over the life of the plan.

Because projected water depletions from BLM actions are highest under Alternative B and because water depletions from non-BLM actions are not expected to vary by alternative, the greatest adverse cumulative water depletions are anticipated under Alternative B and the least adverse cumulative water depletions under Alternative A.

Cumulative Issue 4 – The cumulative impact of habitat fragmentation on wildlife and special status wildlife species

The condition of the planning area with respect to habitat fragmentation is described in the introduction of Biological Resources, Chapter 3. Potential impacts contributing to habitat fragmentation are described in the introduction of Biological Resources in this chapter. Potential impacts stemming from habitat fragmentation are described in appropriate biological resources sections (e.g., vegetation, wildlife), in this chapter.

A management action to address the challenge of habitat fragmentation is included in alternatives B, C, and E (see Chapter 2). In general, this management action closes blocks of BLM-administered land to oil and gas leasing, geophysical operation, mineral material disposal, and to wind and renewable energy development. Alternatives C and E propose a smaller area and include fewer restrictions relative to Alternative B. For example, restrictions proposed for alternatives C and E apply to fewer blocks and only to blocks of land containing significant big game crucial winter range or greater sage-grouse leks and habitats. The identified blocks of land currently have low development potential for coal, oil, and gas; public surface ownership exceeding 50 percent; and contiguous blocks of native vegetation exceeding 10,000 acres in size. The total area comprising the blocks of land for alternatives B, C, and E are shown in Table 4-27 by land administration. It is important to note that some of the areas identified within these blocks are not administered by BLM and, therefore, BLM does not manage land use in these areas.

Table 4-27. Contiguous Blocks of Native Habitat Identified in the Casper Planning Area to Avoid Habitat Fragmentation (acres)

Land Administration	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E *(Preferred Alternative)*
Acres of BLM-Administered Minerals Identified To Avoid Habitat Fragmentation	0	580,007	238,724	0	168,386
Acres of Non-BLM-Administered Minerals Identified To Avoid Habitat Fragmentation	0	80,491	40,581	0	24,159
Total Acres in the Planning Area Identified To Avoid Habitat Fragmentation	0	660,498	279,305	0	192,545

BLM Bureau of Land Management

The challenge of habitat fragmentation and associated impacts, primarily to biological resources, is anticipated to continue under all alternatives. Moreover, surface-disturbing activities, fire, spread of INPS, and activities that remove vegetation and disturb soil are anticipated to contribute to habitat fragmentation within the planning area, regardless of land ownership. Habitat fragmentation from non-BLM actions in the planning area is primarily anticipated from urban and energy development and associated infrastructure (e.g., roads), although the intensity of development on private lands is not expected to vary by alternative. The majority of habitat fragmentation is anticipated to occur proximate to population centers (e.g., Casper) and in the eastern half of the planning area, where land ownership is primarily state and private.

Supported by favorable economic conditions, population centers are expected to grow in both geographic area and population density over the life of the plan. The trend in western states of subdividing larger private parcels to support development of residential subdivisions and ranchettes (e.g., 35-acre parcels) is expected to continue and contribute to habitat fragmentation. As larger tracts of land adjacent to public lands are subdivided, the WUI and its associated issues (e.g., fragmentation, fire suppression, spread of INPS) are also expected to grow. As the WUI expands, some tracts of BLM-administered land may

become disconnected or isolated from other native habitats and ultimately adversely impact planning area biological diversity. The fences, roads, spread of INPS, fire suppression, and changes in land use associated with an expanding WUI all serve to fragment habitat. In addition, multiple land owners in the WUI, and especially in the eastern planning area, are expected to result in varied management of resources and resource use impacting habitat fragmentation, including INPS spread, fire, wildlife, livestock grazing, OHV use, and development.

The greatest adverse cumulative habitat fragmentation impacts are anticipated under alternatives A and D because these alternatives do not include management actions anticipated to address habitat fragmentation. Alternatives A and D generally are anticipated to allow the most development with the least restrictions on BLM-administered lands. Based on the amount of BLM-administered land proposed for managing habitat fragmentation, Alternative B is anticipated to have the least adverse impact to habitat fragmentation, followed in order of increasing impact by alternatives C and E. Although, for this analysis, habitat fragmentation from non-BLM actions are assumed to not vary across alternatives, the magnitude of fragmentation from non-BLM actions on private lands is expected to be substantively greater than fragmentation on public lands. This conclusion is based on the fact that most land surface in the planning area is and will continue to be privately held and, therefore, subject to fewer restrictions and more development compared to public lands.

Cumulative Issue 5 – The cumulative impact of development activities on the historical setting of cultural resources (including National Historic Trails and Other Historic Trails)

The cumulative impact of development activities from BLM and non-BLM actions within the planning area is anticipated to adversely impact the context and historical setting of some cultural resources and NHTs and Other Historic Trails. No quantitative data are available for assessing cumulative impacts to the historical setting of cultural resources and NHTs and Other Historic Trails. Moreover, plan alternatives are not anticipated to result in measurable differences in impacts to historical settings from non-BLM actions.

In general, although cultural resources on public land enjoy legal protection, similar protection does not apply to cultural resources from private actions on private lands. Likewise, limited restrictions on public lands exist to protect the historical setting of cultural resources on public lands. For example, alternatives B and C propose an NSO buffer within 300 feet of select cultural resources. However, due to the mixture of public and private land ownership adjacent to other cultural resources such as NHTs and Other Historic Trails, cumulative impacts to the historical setting are not regulated and expected to continue. For example, although the BLM may elect to prevent surface occupancy within a defined distance from NHTs and Other Historic Trails, no similar requirement applies to adjacent private lands. No basis exists for assuming any difference in cumulative impact of development activities on the historical setting of cultural resources and NHTs and Other Historic Trails.

Cumulative Issue 6 – The cumulative impact of management actions and projected development on the economy of local communities

Cumulative impacts to economic conditions most likely are related to oil and gas activity and ranching and livestock grazing. The impacts of oil and gas drilling and production described in the economic impact section of this chapter relate to activities only on BLM-administered surface and federal mineral estate within the planning area. However, oil and gas activity on private and state land is estimated to constitute 31 percent to 33 percent of oil and gas activity in alternatives A, C, D, and E, and 81 percent of activity in Alternative B. Thus, when oil and gas activity on state and private land is taken into account, the reduction in overall activity in Alternative B – and associated earnings, employment, output, and projected tax revenues – is proportionally smaller (compared to the reduction in activity on federal lands

only). Table 4-28 summarizes potential economic impacts due to estimated oil and gas activity on federal, state, and private lands.

Oil and gas development is driven primarily by variables outside of the BLM's control, including national and international energy prices, investment within the planning area, and business strategies of operators. In addition, oil and gas activity on state and private lands will be impacted by land management decisions of other agencies and individuals. Because the pace of development is unknown, actual cumulative impacts may differ from those projected in Table 4-28.

Because energy prices are the predominant force behind the pace of oil and gas development, some communities may experience boom and bust cycles as a result of fluctuations in energy prices. This can cause hardships to local populations because of the temporary increased demand for housing and community services. Infrastructure may be expanded during boom times, and loans or bonds to pay for expansion of infrastructure must still be repaid if the boom turns to a bust.

Table 4-28. Cumulative (including state and private) Impacts of Oil and Gas Development over the Life of the Plan in the Casper Planning Area[1]

Impact	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E (Preferred Alternative)
Annual Average Earnings	$89.7	$43.6	$85.4	$88.6	$89.2
Annual Average Output	$890.3	$599.6	$863.2	$883.1	$887.4
Net Present Value of Output	$8,973	$6,515	$8,746	$8,913	$8,950
Annual Average Employment[2]	2,349	1,131	2,236	2,319	2,336
Annual Average Federal Tax Revenues	$50.1	$10.2	$47.4	$49.8	$50.0
Annual Average State Tax Revenues	$34.8	$25.7	$34.0	$34.6	$34.7
Annual Average Local Tax Revenues	$36.6	$27.0	$35.7	$36.3	$36.5

Source: Calculated using the IMPLAN model, as described in the text.

[1]All dollar values are in millions of year 2003 dollars and represent annual averages, except for the net present value of output, which is discounted at a 7-percent real discount rate, as recommended in OMB 2002.

[2]Employment is in annual job equivalents and represents an annual average.

Increasing energy development, such as the recent expansion in natural gas drilling and production, is likely to have substantive social impacts in Casper because of the concentration of oil and gas service companies in that city. However, since Casper is a relatively large city with a diversified economic base, it likely has the capacity to absorb the potential economic growth and resulting increase in population. In addition, increased oil and gas development will bring increased mineral tax revenues, especially for Natrona and Converse counties, which could mitigate the increased demand for community services and infrastructure that more development would bring.

A potential for cumulative economic impacts related to livestock grazing and ranching also exists. Cattle and sheep ranchers in the planning area face increasing pressure from local land developers and market trends. The potential loss of BLM land currently available for grazing, in addition to pre-existing economic pressures, could result in some adverse economic impacts to some ranchers. For example, short-term loss of land available for grazing could occur as a result of the BLM's policy of deferring grazing for 2 years following fire. Although not mandated by policy, some period of short-term deferment also is anticipated to occur on private rangeland following fire. The cumulative impact of INPS spread, and an associated reduction in forage on public and private lands in the planning area could also adversely impact livestock grazing.

The cumulative impacts of BLM management actions is not anticipated to have long-term adverse impacts on livestock grazing on public lands, since the projected availability of federal AUMs is generally constant over the life of the plan. Non-BLM actions that remove private lands from livestock grazing (such as development and urbanization) could result in adverse cumulative economic and social impacts related to livestock grazing. However, given that impacts on grazing lands occur gradually over the life of this plan and would be spread over the planning area, adverse economic impacts on individual ranchers is not anticipated. On the other hand, even if economic impacts on ranchers are not substantial, the social impacts could be more significant because of the importance of ranching to the custom, culture, and history of communities in the planning area.

Cumulative Issue 7 – The cumulative impact of air quality on public health and welfare within the planning area and protected Class I areas outside the planning area

Base year and anticipated annual air emissions for the life of the plan are organized by project scenario and resource as shown in Tables 4-29 to 4-34 at the end of this chapter. These tables identify each anticipated emission category for: (1) projected BLM actions, (2) projected non-BLM actions, and (3) the cumulative total of these actions.

BLM and non-BLM RFAs are anticipated to increase emissions in the planning area over the life of the plan. For the planning area, the cumulative air quality impacts (as measured against national and state ambient air quality standards) are anticipated to be roughly the same on BLM and non-BLM-managed lands because it is assumed that the density of activities are the same in both areas. This conclusion also assumes that nearby operations on both BLM and non-BLM-managed lands would not combine to result in greater impacts on a local scale. Because of proposed development restrictions on BLM-managed land, adverse cumulative impacts to air quality are anticipated to be the least under Alternative B. Cumulative projected emissions under alternatives A, C, D, and E are similar; all are projected to be greater than under Alternative B. Cumulative emissions within the planning area are not anticipated to result in air quality impacts that exceed national or state ambient air quality standards because the emission sources likely will be widely separated. Potential impacts to PSD increments, visibility and atmospheric deposition in distant Class I National Wilderness Areas, may be substantial.

4.10 Irreversible and Irretrievable Commitment of Resources

Section 1502.16 of CEQ regulations requires that the discussion of environmental consequences include a description of "…any irreversible or irretrievable commitment of resources which would be involved in the proposal should it be implemented." An irreversible commitment of resources refers to decisions impacting the use of nonrenewable resources. For example, extraction and processing of sand and gravel as part of an aggregate mining operation is considered an irreversible commitment of salable minerals because once the minerals are extracted and processed, they cannot be renewed in the ground within a reasonable timeframe. An irretrievable commitment of resources refers to decisions resulting in the loss of production or use of a resource. For example, a decision not to treat woodlands encroaching into adjacent grassland habitat results in the irretrievable loss of forage production from the grassland community. This action is not irreversible, because once a treatment is applied, the forage production of the grassland is restored.

The decision to select one of the five alternatives described in this Draft RMP/EIS does not constitute an irreversible or irretrievable commitment of resources because the decision does not authorize on-the-ground activities. Instead, decisions made in the selected plan serve to guide future actions and subsequent site-specific decisions. Following the signing of the ROD for the RMP, subsequent implementation plans (activity- or project-specific) will be developed and implemented by the BLM. Implementing decisions requires appropriate project-specific planning, NEPA analysis, and BLM's final approval authorizing on-the-ground activities to proceed.

Assuming that BLM selects one of the action alternatives and that subsequent implementation decisions authorize activity- or project-specific plans, irreversible and irretrievable commitment of resources could occur to select resources. No irreversible or irretrievable commitment of resources are anticipated for air quality, geologic resources, fire management and ecology, vegetation, fish and wildlife, special status species, visual resources, lands and realty, renewable energy, rights-of-way and corridors, transportation, OHV use, recreation, special designations, and socioeconomic resources.

PHYSICAL, BIOLOGICAL, AND HERITAGE RESOURCES

Soil. Surface-disturbing activities, nonmechanized activities, and natural processes cause soil erosion in the planning area. Soil formation requires thousands of years to replenish. Eroded soil and lost productivity cannot be recovered. The loss of topsoil from soil erosion results in an irretrievable loss of soil productivity.

Water. Depletion of water to the Platte River from BLM actions in the North Platte watershed may result in an irretrievable commitment of water that would otherwise have contributed to the Platte River System. The production of water from oil and gas wells in the planning area may be an irretrievable commitment of groundwater depending on its use once it reaches the surface.

Coal. Removal of coal from the ground is considered an irreversible commitment of these resources.

Fluid Minerals. Removal of oil and gas from the ground is considered an irreversible commitment of these resources.

Locatable Minerals. Removal of locatable minerals from the ground is considered an irreversible commitment of these resources.

Mineral Materials. Removal of mineral materials from the planning area is considered an irreversible commitment of these resources.

Nonenergy Leasables. Removal of nonenergy leasables from the ground is considered an irreversible commitment of these resources.

RESOURCE USES

Forest Products. Any decision to prohibit silviculture treatments is an irretrievable commitment of the wood fiber produced. As trees grow older, ultimately die, and decompose, the wood fiber that was not treated is irretrievably lost.

Livestock Grazing. Forage utilized by livestock is unavailable for utilization by wildlife. Conversely, any decision to prohibit livestock grazing is an irretrievable commitment of the forage produced. As grasses and forbs grow older, ultimately die, and decompose, the forage that is not utilized is irretrievably lost for production of wildlife or livestock.

4.11 Unavoidable Adverse Impacts

Unavoidable adverse impacts are the residual impacts of implementing management actions or allowable uses after BMPs and mitigation measures are applied.

The decision to select one of the five alternatives described in this Draft RMP/EIS would not result in unavoidable adverse impacts because the decision does not authorize on-the-ground activities. Instead, decisions made in the selected plan serve to guide future actions and subsequent site-specific decisions. Following signing of the ROD for the RMP, subsequent plans (activity- or project-specific) will be developed and implemented by BLM. Implementation decisions require appropriate project-specific planning and NEPA analysis and constitute BLM's final approval authorizing on-the-ground activities to proceed.

Assuming that BLM selects one of the action alternatives and that subsequent implementation decisions authorize activity- or project-specific plans, unavoidable adverse impacts could occur to select resources.

Surface-disturbing activities (e.g., construction of well pads and roads, pits and reservoirs, pipelines and powerlines, mining, and vegetation treatments), OHV use, fire management and ecology, some recreational activities, and operation and maintenance of existing facilities and infrastructure in the planning area will cause fugitive dust, exhaust emissions, and smoke, thereby adversely impacting air quality.

Surface-disturbing activities, OHV use, fire management and ecology, some recreational activities, uncontrolled animal concentrations, and operation and maintenance of existing facilities and infrastructure in the planning area may cause soil erosion and soil compaction. These same activities, in combination with precipitation events, also may result in runoff and sedimentation to existing surface waters. Additional unavoidable adverse impacts from these activities include transport and spread of INPS in the planning area. INPS will continue to spread via the wind, in water courses, and by attaching to livestock, wildlife, humans, and vehicles. The presence of INPS in the planning area is considered an unavoidable impact.

Surface-disturbing activities and the development of mineral, energy, and other facilities in the planning area are expected to cause the unavoidable degradation, loss, and fragmentation of habitats. OHV use, fire management and ecology, some recreational activities, concentrated livestock grazing, and operation and maintenance of existing facilities and infrastructure in the planning area may contribute to the unavoidable degradation, loss, and fragmentation of habitats.

Protection of some resource values (e.g., wildlife, special status species, cultural, and paleontological resources) will adversely impact the use of other resources, such as minerals and renewable energy. Conversely, use of minerals and renewable energy are expected to adversely impact the distribution of some wildlife, special status species, and vegetative communities.

Surface-disturbing activities and development from BLM actions unavoidably will change the landscape, scenic quality, and setting in the planning area. Non-BLM actions on lands adjacent to BLM-administered lands also will change the landscape and setting. Fire, insect and disease damage, and development also are expected to temporarily impact the scenic quality of the planning area. Surface-disturbing activities, OHV use, vandalism, and natural processes (e.g., fire and erosion) may adversely impact cultural and paleontological resources in the planning area.

Table 4-29. Cumulative Annual Emissions for BLM Activities within the Casper Planning Area – Baseline Year 2001

	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_x			SO_x		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
CBNG Development/Production	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas Development/Production	85.30	34.84	120.14	34.46	14.07	48.53	430.68	175.91	606.59	6.05	2.47	8.52
Oil Development/Production	63.59	25.98	89.57	20.75	8.48	29.23	448.74	183.29	632.03	59.37	24.25	83.62
Locatable Minerals	151.06	123.59	274.65	21.11	17.27	38.38	19.34	15.82	35.16	2.02	1.65	3.68
Salable Minerals	295.25	241.57	536.82	38.08	31.16	69.23	18.57	15.19	33.77	0.46	0.38	0.84
Coal Mine	479.82	41.72	521.54	112.39	9.77	122.16	373.18	32.45	405.63	13.99	1.22	15.21
Resource Roads	1.37	7.18	8.55	0.15	0.81	0.96	0.16	0.85	1.01	0.00	0.02	0.02
ROW Corridors	19.82	104.05	123.87	4.74	24.87	29.60	15.99	83.95	99.94	1.72	9.05	10.78
Livestock/Grazing	11.44	60.06	71.50	1.77	9.31	11.09	1.19	6.22	7.41	0.04	0.19	0.23
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forest and Woodlands	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetation Management	1.16	6.08	7.24	0.19	0.98	1.16	0.29	1.50	1.79	0.01	0.04	0.05
OHVs	7.00	36.75	43.75	7.00	36.75	43.75	2.94	15.44	18.38	0.00	0.00	0.00
Total	**1,115.80**	**681.82**	**1,797.62**	**240.64**	**153.46**	**394.10**	**1,311.06**	**530.62**	**1,841.69**	**83.67**	**39.27**	**122.94**

	CO			VOC			HAP		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
CBNG Development/Production	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas Development/Production	394.17	161.00	555.17	2,599.13	1,061.61	3,660.74	267.02	109.06	376.08
Oil Development/Production	112.78	46.07	158.85	14.65	5.98	20.63	1.47	0.60	2.06
Locatable Minerals	49.34	40.37	89.72	7.18	5.88	13.06	0.72	0.59	1.31
Salable Minerals	9.31	7.62	16.93	1.69	1.38	3.07	0.17	0.14	0.31
Coal Mine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Resource Roads	0.05	0.27	0.33	0.01	0.07	0.08	0.00	0.01	0.01

Table 4-29. Cumulative Annual Emissions for BLM Activities within the Casper Planning Area – Baseline Year 2001 (Continued)

	Emissions (Tons per Year)								
	CO			VOC			HAP		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
ROW Corridors	22.27	116.91	139.18	5.40	28.38	33.78	0.54	2.84	3.38
Livestock/Grazing	0.56	2.95	3.51	0.13	0.70	0.83	0.01	0.07	0.08
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forest and Woodlands	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetation Management	0.14	0.73	0.87	0.03	0.15	0.18	0.00	0.02	0.02
OHVs	427.44	2,244.07	2,671.51	229.98	1,207.42	1,437.40	23.00	120.74	143.74
Total	**1,016.07**	**2,619.98**	**3,636.05**	**2,858.21**	**2,311.57**	**5,169.78**	**292.92**	**234.06**	**526.98**

BLM Bureau of Land Management
CBNG coalbed natural gas
ROW rights-of-way
OHV off-highway vehicles

Table 4-30. Cumulative Annual Emissions Associated with Alternative A

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_x			SO_x		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2011												
CBNG Development/Production	48.77	21.91	70.68	15.18	6.82	21.99	60.25	27.07	87.32	0.47	0.21	0.67
Natural Gas Development/Production	91.56	41.13	132.69	35.24	15.83	51.07	432.54	194.33	626.87	5.90	2.65	8.55
Oil Development/Production	65.25	29.32	94.57	20.03	9.00	29.03	413.82	185.92	599.73	54.73	24.59	79.32
Locatable Minerals	150.89	123.45	274.34	20.94	17.13	38.08	16.64	13.61	30.25	1.92	1.57	3.50
Salable Minerals	294.92	241.30	536.21	37.74	30.88	68.62	13.17	10.78	23.95	0.26	0.22	0.48
Coal Mine	525.40	45.69	571.09	121.89	10.60	132.49	408.63	35.53	444.16	15.32	1.33	16.65
Resource Roads	1.36	7.16	8.52	0.15	0.78	0.93	0.08	0.41	0.49	0.00	0.00	0.00
ROW Corridors	19.56	102.69	122.25	4.48	23.51	27.99	12.01	63.07	75.08	1.57	8.23	9.80
Livestock/Grazing	11.40	59.87	71.27	1.74	9.12	10.85	0.62	3.27	3.89	0.02	0.08	0.09
Renewable Energy	88.54	464.86	553.40	13.37	70.17	83.54	1.72	9.03	10.76	0.06	0.32	0.39
Fire Management	24.76	129.98	154.74	0.78	4.08	4.86	0.68	3.56	4.24	0.04	0.19	0.23
Forest and Woodlands	22.33	117.22	139.55	3.39	17.80	21.19	0.25	1.31	1.56	0.02	0.12	0.14
Vegetation Management	1.15	6.01	7.16	0.17	0.91	1.08	0.02	0.08	0.10	0.00	0.01	0.01
OHVs	14.76	77.51	92.27	14.76	77.51	92.27	6.29	33.04	39.34	0.00	0.00	0.00
Project Year 2011 Total	**1,360.65**	**1,468.09**	**2,828.74**	**289.85**	**294.15**	**584.00**	**1,366.72**	**581.02**	**1,947.74**	**80.31**	**39.53**	**119.84**

Project Scenario/Resource	CO			VOC			HAP		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2011									
CBNG Development/Production	99.98	44.92	144.90	49.08	22.05	71.13	33.88	15.22	49.11
Natural Gas Development/Production	460.55	206.91	667.46	3,665.84	1,646.97	5,312.82	376.35	169.08	545.43
Oil Development/Production	104.12	46.78	150.90	13.55	6.09	19.64	1.36	0.61	1.96
Locatable Minerals	48.24	39.47	87.71	6.93	5.67	12.60	0.69	0.57	1.26
Salable Minerals	7.10	5.81	12.92	1.18	0.96	2.14	0.12	0.10	0.21
Coal Mine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 4-30. Cumulative Annual Emissions Associated with Alternative A (Continued)

	Emissions (Tons per Year)								
	CO			VOC			HAP		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
Project Year 2011									
Resource Roads	0.02	0.09	0.10	0.01	0.03	0.04	0.00	0.00	0.00
ROW Corridors	20.49	107.58	128.07	4.97	26.11	31.08	0.50	2.61	3.11
Livestock/Grazing	0.34	1.79	2.13	0.07	0.36	0.43	0.01	0.04	0.04
Renewable Energy	1.18	6.20	7.38	0.24	1.27	1.51	0.02	0.13	0.15
Fire Management	1.58	8.28	9.85	0.61	3.19	3.80	0.06	0.32	0.38
Forest and Woodlands	1.28	6.70	7.97	0.42	2.20	2.61	0.04	0.22	0.26
Vegetation Management	0.05	0.27	0.32	0.01	0.04	0.04	0.00	0.00	0.00
OHVs	1,201.68	6,308.84	7,510.52	449.97	2,362.34	2,812.31	45.00	236.23	281.23
Project Year 2011 Total	**1,946.62**	**6,783.63**	**8,730.24**	**4,192.88**	**4,077.28**	**8,270.16**	**458.02**	**425.13**	**883.16**

	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_x			SO_x		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
Project Year 2020												
CBNG Development/Production	58.92	26.47	85.39	16.57	7.45	24.02	59.35	26.66	86.01	0.47	0.21	0.68
Natural Gas Development/Production	107.70	48.39	156.08	42.63	19.15	61.78	515.51	231.60	747.11	6.23	2.80	9.02
Oil Development/Production	69.42	31.19	100.61	20.62	9.26	29.88	414.89	186.40	601.29	54.86	24.65	79.51
Locatable Minerals	150.81	123.39	274.21	20.87	17.07	37.94	14.31	11.71	26.02	1.92	1.57	3.50
Salable Minerals	294.77	241.17	535.94	37.59	30.76	68.35	8.52	6.97	15.49	0.26	0.22	0.48
Coal Mine	601.69	52.32	654.01	139.59	12.14	151.73	467.97	40.69	508.66	17.55	1.53	19.07
Resource Roads	1.36	7.14	8.50	0.15	0.77	0.91	0.01	0.03	0.03	0.00	0.00	0.00
ROW Corridors	19.42	101.96	121.38	4.34	22.78	27.12	8.22	43.16	51.38	1.57	8.23	9.80
Livestock/Grazing	11.39	59.78	71.16	1.72	9.03	10.75	0.10	0.54	0.64	0.02	0.08	0.09
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	24.74	129.90	154.65	0.76	4.01	4.77	0.21	1.10	1.31	0.04	0.19	0.23
Forest and Woodlands	22.32	117.20	139.52	3.39	17.78	21.17	0.14	0.71	0.85	0.02	0.12	0.14

Table 4-30. Cumulative Annual Emissions Associated with Alternative A (Continued)

Project Year 2020												
	Emissions (Tons per Year)											
	PM_{10}			**$PM_{2.5}$**			**NO_x**			**SO_x**		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
Vegetation Management	1.14	6.01	7.16	0.17	0.91	1.08	0.01	0.05	0.06	0.00	0.01	0.01
OHVs	17.76	93.26	111.02	17.76	93.26	111.02	8.35	43.85	52.20	0.00	0.00	0.00
Project Year 2020 Total	**1,381.45**	**1,038.19**	**2,419.64**	**306.17**	**244.36**	**550.53**	**1,497.58**	**593.48**	**2,091.06**	**82.94**	**39.61**	**122.54**

	Emissions (Tons per Year)								
	CO			**VOC**			**HAP**		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
Project Year 2020									
CBNG Development/Production	99.90	44.88	144.78	48.97	22.00	70.97	33.80	15.18	48.98
Natural Gas Development/Production	590.55	265.32	855.87	4,233.14	1,901.84	6,134.98	436.07	195.91	631.98
Oil Development/Production	104.46	46.93	151.39	13.61	6.12	19.73	1.36	0.61	1.97
Locatable Minerals	47.73	39.05	86.78	6.84	5.60	12.44	0.68	0.56	1.24
Salable Minerals	6.08	4.97	11.05	1.01	0.82	1.83	0.10	0.08	0.18
Coal Mine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Resource Roads	0.00	0.01	0.01	0.00	0.01	0.02	0.00	0.00	0.00
ROW Corridors	19.68	103.31	122.99	4.85	25.47	30.32	0.49	2.55	3.03
Livestock/Grazing	0.21	1.09	1.29	0.06	0.30	0.35	0.01	0.03	0.04
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	1.33	6.97	8.29	0.43	2.26	2.69	0.04	0.23	0.27
Forest and Woodlands	1.06	5.56	6.61	0.21	1.13	1.34	0.02	0.11	0.13
Vegetation Management	0.05	0.27	0.32	0.01	0.03	0.04	0.00	0.00	0.00
OHVs	1,482.84	7,784.91	9,267.75	543.49	2,853.34	3,396.83	54.35	285.33	339.68
Project Year 2020 Total	**2,353.87**	**8,303.26**	**10,657.13**	**4,852.62**	**4,818.92**	**9,671.54**	**526.91**	**500.61**	**1,027.52**

BLM Bureau of Land Management
CBNG coalbed natural gas
CO carbon monoxide
HAP hazardous air pollutant
NO_x nitrogen oxides
OHV off-highway vehicles
PM_{10} particulate matter less than 10 microns in diameter
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
ROW rights-of-way
SO_x sulfur oxides
VOC volatile organic compound

Table 4-31. Cumulative Annual Emissions Associated with Alternative B

	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_x			SO_x		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
Project Year 2011												
CBNG Development/Production	6.78	28.89	35.66	2.13	9.09	11.22	8.38	35.73	44.11	0.07	0.28	0.35
Natural Gas Development/Production	41.22	175.72	216.94	18.51	78.92	97.43	215.24	917.62	1,132.87	1.14	4.85	5.99
Oil Development/Production	40.42	172.32	212.74	6.62	28.22	34.84	43.43	185.13	228.55	5.65	24.10	29.75
Locatable Minerals	145.04	118.67	263.70	20.13	16.47	36.59	16.03	13.11	29.14	1.85	1.52	3.37
Salable Minerals	284.14	232.48	516.62	36.36	29.75	66.12	12.69	10.38	23.08	0.25	0.21	0.46
Coal Mine	525.40	45.69	571.09	121.89	10.60	132.49	408.63	35.53	444.16	15.32	1.33	16.65
Resource Roads	1.36	7.16	8.52	0.15	0.78	0.93	0.08	0.41	0.49	0.00	0.00	0.00
ROW Corridors	3.72	19.51	23.23	0.85	4.47	5.32	2.28	11.98	14.27	0.30	1.56	1.86
Livestock/Grazing	11.40	59.87	71.27	1.74	9.12	10.85	0.62	3.27	3.89	0.02	0.08	0.09
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	24.76	129.98	154.74	0.78	4.08	4.86	0.68	3.56	4.24	0.04	0.19	0.23
Forest and Woodlands	14.66	76.98	91.64	2.23	11.73	13.96	0.21	1.08	1.28	0.01	0.07	0.09
Vegetation Management	1.15	6.01	7.16	0.17	0.91	1.08	0.02	0.08	0.10	0.00	0.01	0.01
OHVs	14.76	77.51	92.27	14.76	77.51	92.27	6.29	33.04	39.34	0.00	0.00	0.00
Project Year 2011 Total	**1,114.81**	**1,150.78**	**2,265.58**	**226.33**	**281.64**	**507.97**	**714.58**	**1,250.94**	**1,965.51**	**24.65**	**34.21**	**58.87**

	CO			VOC			HAP		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
Project Year 2011									
CBNG Development/Production	13.79	58.79	72.58	6.76	28.83	35.59	4.67	19.89	24.56
Natural Gas Development/Production	309.98	1,321.49	1,631.47	584.45	2,491.61	3,076.06	65.49	279.19	344.68
Oil Development/Production	11.50	49.04	60.55	1.64	6.98	8.62	0.16	0.70	0.86
Locatable Minerals	46.48	38.03	84.50	6.68	5.46	12.14	0.67	0.55	1.21
Salable Minerals	6.84	5.60	12.44	1.14	0.93	2.06	0.11	0.09	0.21
Coal Mine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Resource Roads	0.02	0.09	0.10	0.01	0.03	0.04	0.00	0.00	0.00

Table 4-31. Cumulative Annual Emissions Associated with Alternative B (Continued)

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAP		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2011									
ROW Corridors	3.89	20.44	24.33	0.94	4.96	5.91	0.09	0.50	0.59
Livestock/Grazing	0.34	1.79	2.13	0.07	0.36	0.43	0.01	0.04	0.04
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	1.58	8.28	9.85	0.61	3.19	3.80	0.06	0.32	0.38
Forest and Woodlands	1.18	6.19	7.36	0.39	2.06	2.45	0.04	0.21	0.24
Vegetation Management	0.05	0.27	0.32	0.01	0.04	0.04	0.00	0.00	0.00
OHVs	1,201.68	6,308.84	7,510.52	449.97	2,362.34	2,812.31	45.00	236.23	281.23
Project Year 2011 Total	**1,597.34**	**7,818.84**	**9,416.18**	**1,052.66**	**4,906.79**	**5,959.45**	**116.30**	**537.72**	**654.01**

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_x			SO_x		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2020												
CBNG Development/Production	8.25	35.19	43.45	2.36	10.06	12.42	8.42	35.88	44.30	0.07	0.29	0.36
Natural Gas Development/Production	42.43	180.90	223.33	19.05	81.20	100.25	220.88	941.64	1,162.52	1.16	4.96	6.12
Oil Development/Production	40.77	173.79	214.56	6.67	28.43	35.10	43.51	185.51	229.03	5.66	24.15	29.81
Locatable Minerals	144.96	118.61	263.57	20.05	16.41	36.46	13.79	11.28	25.07	1.85	1.52	3.37
Salable Minerals	284.00	232.36	516.36	36.22	29.64	65.86	8.21	6.72	14.92	0.25	0.21	0.46
Coal Mine	601.69	52.32	654.01	139.59	12.14	151.73	467.97	40.69	508.66	17.55	1.53	19.07
Resource Roads	1.36	7.14	8.50	0.15	0.77	0.91	0.01	0.03	0.03	0.00	0.00	0.00
ROW Corridors	3.69	19.37	23.06	0.82	4.33	5.15	1.56	8.20	9.76	0.30	1.56	1.86
Livestock/Grazing	11.39	59.78	71.16	1.72	9.03	10.75	0.10	0.54	0.64	0.02	0.08	0.09
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	24.74	129.90	154.65	0.76	4.01	4.77	0.21	1.10	1.31	0.04	0.19	0.23
Forest and Woodlands	14.66	76.96	91.62	2.23	11.70	13.93	0.09	0.47	0.57	0.01	0.07	0.09
Vegetation Management	1.14	6.01	7.16	0.17	0.91	1.08	0.01	0.05	0.06	0.00	0.01	0.01
OHVs	17.76	93.26	111.02	17.76	93.26	111.02	8.35	43.85	52.20	0.00	0.00	0.00
Project Year 2020 Total	**1,196.86**	**1,185.60**	**2,382.45**	**247.56**	**301.88**	**549.44**	**773.10**	**1,275.96**	**2,049.06**	**26.91**	**34.56**	**61.48**

Table 4-31. Cumulative Annual Emissions Associated with Alternative B (Continued)

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAP		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2020									
CBNG Development/Production	14.10	60.13	74.23	6.91	29.45	36.36	4.77	20.32	25.09
Natural Gas Development/Production	319.88	1,363.69	1,683.56	541.96	2,310.47	2,852.44	61.47	262.06	323.54
Oil Development/Production	11.53	49.16	60.70	1.64	7.00	8.64	0.16	0.70	0.86
Locatable Minerals	45.98	37.62	83.60	6.59	5.39	11.99	0.66	0.54	1.20
Salable Minerals	5.85	4.79	10.64	0.97	0.79	1.76	0.10	0.08	0.18
Coal Mine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Resource Roads	0.00	0.01	0.01	0.00	0.01	0.02	0.00	0.00	0.00
ROW Corridors	3.74	19.63	23.37	0.92	4.84	5.76	0.09	0.48	0.58
Livestock/Grazing	0.21	1.09	1.29	0.06	0.30	0.35	0.01	0.03	0.04
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	1.33	6.97	8.29	0.43	2.26	2.69	0.04	0.23	0.27
Forest and Woodlands	0.96	5.05	6.01	0.19	0.99	1.17	0.02	0.10	0.12
Vegetation Management	0.05	0.27	0.32	0.01	0.03	0.04	0.00	0.00	0.00
OHVs	1,482.84	7,784.91	9,267.75	543.49	2,853.34	3,396.83	54.35	285.33	339.68
Project Year 2020 Total	**1,886.48**	**9,333.30**	**11,219.78**	**1,103.17**	**5,214.88**	**6,318.05**	**121.67**	**569.88**	**691.55**

BLM Bureau of Land Management
CBNG coalbed natural gas
CO carbon monoxide
HAP hazardous air pollutant
NO_x nitrogen oxides
OHV off-highway vehicles
PM_{10} particulate matter less than 10 microns in diameter
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
ROW rights-of-way
SO_x sulfur oxides
VOC volatile organic compound

Table 4-32. Cumulative Annual Emissions Associated with Alternative C

	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_x			SO_x		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
Project Year 2011												
CBNG Development/Production	44.80	22.07	66.87	13.93	6.86	20.79	55.30	27.24	82.53	0.43	0.21	0.64
Natural Gas Development/Production	86.47	42.59	129.06	33.56	16.53	50.08	410.66	202.26	612.92	5.41	2.67	8.08
Oil Development/Production	62.74	30.90	93.64	18.65	9.19	27.84	375.75	185.07	560.82	49.69	24.47	74.16
Locatable Minerals	180.66	147.81	328.47	25.04	20.49	45.54	20.21	16.53	36.74	2.34	1.91	4.25
Salable Minerals	357.87	292.80	650.67	45.79	37.47	83.26	16.00	13.09	29.09	0.32	0.26	0.58
Coal Mine	525.40	45.69	571.09	121.89	10.60	132.49	408.63	35.53	444.16	15.32	1.33	16.65
Resource Roads	0.95	4.97	5.92	0.10	0.54	0.65	0.05	0.29	0.34	0.00	0.00	0.00
ROW Corridors	17.99	94.47	112.47	4.12	21.63	25.75	11.05	58.02	69.08	1.44	7.57	9.02
Livestock/Grazing	11.40	59.87	71.27	1.74	9.12	10.85	0.62	3.27	3.89	0.02	0.08	0.09
Renewable Energy	88.54	464.86	553.40	13.37	70.17	83.54	1.72	9.03	10.76	0.06	0.32	0.39
Fire Management	24.76	129.98	154.74	0.78	4.08	4.86	0.68	3.56	4.24	0.04	0.19	0.23
Forest and Woodlands	39.31	206.35	245.66	5.95	31.23	37.18	0.32	1.68	2.00	0.04	0.19	0.23
Vegetation Management	1.15	6.01	7.16	0.17	0.91	1.08	0.02	0.08	0.10	0.00	0.01	0.01
OHVs	14.76	77.51	92.27	14.76	77.51	92.27	6.29	33.04	39.34	0.00	0.00	0.00
Project Year 2011 Total	**1,456.79**	**1,625.87**	**3,082.67**	**299.86**	**316.33**	**616.19**	**1,307.30**	**588.70**	**1,896.00**	**75.10**	**39.23**	**114.33**

	CO			VOC			HAP		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
Project Year 2011									
CBNG Development/Production	91.63	45.13	136.76	44.97	22.15	67.12	31.04	15.29	46.33
Natural Gas Development/Production	445.62	219.48	665.11	3,398.09	1,673.69	5,071.78	349.31	172.05	521.35
Oil Development/Production	94.60	46.60	141.20	12.33	6.07	18.40	1.23	0.61	1.84
Locatable Minerals	58.59	47.94	106.52	8.41	6.88	15.30	0.84	0.69	1.53
Salable Minerals	8.63	7.06	15.69	1.43	1.17	2.60	0.14	0.12	0.26
Coal Mine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 4-32. Cumulative Annual Emissions Associated with Alternative C (Continued)

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAP		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2011									
Resource Roads	0.01	0.06	0.07	0.00	0.02	0.03	0.00	0.00	0.00
ROW Corridors	18.85	98.97	117.82	4.58	24.02	28.59	0.46	2.40	2.86
Livestock/Grazing	0.34	1.79	2.13	0.07	0.36	0.43	0.01	0.04	0.04
Renewable Energy	1.18	6.20	7.38	0.24	1.27	1.51	0.02	0.13	0.15
Fire Management	1.58	8.28	9.85	0.61	3.19	3.80	0.06	0.32	0.38
Forest and Woodlands	1.44	7.57	9.02	0.46	2.41	2.87	0.05	0.24	0.29
Vegetation Management	0.05	0.27	0.32	0.01	0.04	0.04	0.00	0.00	0.00
OHVs	1,201.68	6,308.84	7,510.52	449.97	2,362.34	2,812.31	45.00	236.23	281.23
Project Year 2011 Total	**1,924.20**	**6,798.18**	**8,722.39**	**3,921.17**	**4,103.62**	**8,024.79**	**428.16**	**428.12**	**856.28**

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_x			SO_x		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2020												
CBNG Development/Production	54.28	26.73	81.01	15.29	7.53	22.82	54.83	27.01	81.84	0.43	0.21	0.65
Natural Gas Development/Production	101.07	49.78	150.86	40.24	19.82	60.06	485.67	239.21	724.88	5.71	2.81	8.52
Oil Development/Production	66.50	32.75	99.25	19.19	9.45	28.64	376.72	185.55	562.27	49.80	24.53	74.34
Locatable Minerals	180.57	147.74	328.31	24.95	20.42	45.37	17.38	14.22	31.60	2.34	1.91	4.25
Salable Minerals	357.69	292.65	650.34	45.61	37.32	82.93	10.35	8.47	18.81	0.32	0.26	0.58
Coal Mine	601.69	52.32	654.01	139.59	12.14	151.73	467.97	40.69	508.66	17.55	1.53	19.07
Resource Roads	0.94	4.96	5.90	0.10	0.53	0.63	0.00	0.02	0.02	0.00	0.00	0.00
ROW Corridors	17.87	93.80	111.67	3.99	20.96	24.95	7.56	39.71	47.27	1.44	7.57	9.02
Livestock/Grazing	11.39	59.78	71.16	1.72	9.03	10.75	0.10	0.54	0.64	0.02	0.08	0.09
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	24.74	129.90	154.65	0.76	4.01	4.77	0.21	1.10	1.31	0.04	0.19	0.23

Table 4-32. Cumulative Annual Emissions Associated with Alternative C (Continued)

	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_x			SO_x		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
Project Year 2020												
Forest and Woodlands	39.30	206.33	245.63	5.95	31.21	37.16	0.20	1.08	1.28	0.04	0.19	0.23
Vegetation Management	1.14	6.01	7.16	0.17	0.91	1.08	0.01	0.05	0.06	0.00	0.01	0.01
OHVs	17.76	93.26	111.02	17.76	93.26	111.02	8.35	43.85	52.20	0.00	0.00	0.00
Project Year 2020 Total	**1,474.95**	**1,196.03**	**2,670.97**	**315.34**	**266.58**	**581.92**	**1,429.36**	**601.48**	**2,030.84**	**77.68**	**39.30**	**116.98**

	CO			VOC			HAP		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
Project Year 2020									
CBNG Development/Production	92.27	45.45	137.72	45.23	22.28	67.51	31.22	15.38	46.59
Natural Gas Development/Production	563.27	277.43	840.70	3,885.90	1,913.95	5,799.86	400.80	197.41	598.20
Oil Development/Production	94.91	46.75	141.66	12.38	6.10	18.48	1.24	0.61	1.85
Locatable Minerals	57.96	47.43	105.39	8.31	6.80	15.11	0.83	0.68	1.51
Salable Minerals	7.38	6.04	13.42	1.22	1.00	2.22	0.12	0.10	0.22
Coal Mine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Resource Roads	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00
ROW Corridors	18.10	95.05	113.15	4.46	23.43	27.90	0.45	2.34	2.79
Livestock/Grazing	0.21	1.09	1.29	0.06	0.30	0.35	0.01	0.03	0.04
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	1.33	6.97	8.29	0.43	2.26	2.69	0.04	0.23	0.27
Forest and Woodlands	1.23	6.43	7.66	0.26	1.35	1.60	0.03	0.13	0.16
Vegetation Management	0.05	0.27	0.32	0.01	0.03	0.04	0.00	0.00	0.00
OHVs	1,482.84	7,784.91	9,267.75	543.49	2,853.34	3,396.83	54.35	285.33	339.68
Project Year 2020 Total	**2,319.55**	**8,317.80**	**10,637.35**	**4,501.76**	**4,830.84**	**9,332.60**	**489.08**	**502.24**	**991.32**

BLM Bureau of Land Management
CBNG coalbed natural gas
CO carbon monoxide
HAP hazardous air pollutant
NO_x nitrogen oxides
OHV off-highway vehicles
PM_{10} particulate matter less than 10 microns in diameter
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
ROW rights-of-way
SO_x sulfur oxides
VOC volatile organic compound

Table 4-33. Cumulative Annual Emissions Associated with Alternative D

	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_x			SO_x		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
Project Year 2011												
CBNG Development/Production	48.84	21.94	70.78	15.19	6.82	22.01	60.28	27.08	87.36	0.47	0.21	0.68
Natural Gas Development/Production	90.56	40.69	131.24	34.91	15.68	50.59	428.25	192.40	620.65	5.80	2.61	8.41
Oil Development/Production	64.76	29.09	93.85	19.76	8.88	28.63	406.32	182.55	588.87	53.74	24.14	77.88
Locatable Minerals	252.87	206.89	459.76	35.06	28.69	63.75	28.21	23.08	51.28	3.26	2.67	5.93
Salable Minerals	499.90	409.01	908.91	63.98	52.34	116.32	22.33	18.27	40.61	0.45	0.37	0.81
Coal Mine	525.40	45.69	571.09	121.89	10.60	132.49	408.63	35.53	444.16	15.32	1.33	16.65
Resource Roads	1.36	7.16	8.52	0.15	0.78	0.93	0.08	0.41	0.49	0.00	0.00	0.00
ROW Corridors	19.76	103.72	123.47	4.52	23.74	28.27	12.13	63.70	75.83	1.58	8.32	9.90
Livestock/Grazing	11.40	59.87	71.27	1.74	9.12	10.85	0.62	3.27	3.89	0.02	0.08	0.09
Renewable Energy	88.54	464.86	553.40	13.37	70.17	83.54	1.72	9.03	10.76	0.06	0.32	0.39
Fire Management	24.76	129.98	154.74	0.78	4.08	4.86	0.68	3.56	4.24	0.04	0.19	0.23
Forest and Woodlands	53.33	279.97	333.30	8.06	42.33	50.39	0.38	2.00	2.38	0.05	0.26	0.31
Vegetation Management	1.15	6.01	7.16	0.17	0.91	1.08	0.02	0.08	0.10	0.00	0.01	0.01
OHVs	14.76	77.51	92.27	14.76	77.51	92.27	6.29	33.04	39.34	0.00	0.00	0.00
Project Year 2011 Total	**1,697.38**	**1,882.38**	**3,579.76**	**334.33**	**351.66**	**685.99**	**1,375.94**	**594.02**	**1,969.95**	**80.79**	**40.50**	**121.29**

	CO			VOC			HAP		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
Project Year 2011									
CBNG Development/Production	99.99	44.92	144.91	49.08	22.05	71.14	33.88	15.22	49.11
Natural Gas Development/Production	457.67	205.62	663.28	3,611.88	1,622.73	5,234.60	370.90	166.64	537.53
Oil Development/Production	102.25	45.94	148.18	13.31	5.98	19.29	1.33	0.60	1.93
Locatable Minerals	81.79	66.92	148.70	11.75	9.61	21.36	1.17	0.96	2.14
Salable Minerals	12.04	9.85	21.90	2.00	1.63	3.63	0.20	0.16	0.36
Coal Mine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Resource Roads	0.02	0.09	0.10	0.01	0.03	0.04	0.00	0.00	0.00

Table 4-33. Cumulative Annual Emissions Associated with Alternative D (Continued)

	Emissions (Tons per Year)								
	CO			VOC			HAP		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
Project Year 2011									
ROW Corridors	20.70	108.65	129.35	5.02	26.37	31.39	0.50	2.64	3.14
Livestock/Grazing	0.34	1.79	2.13	0.07	0.36	0.43	0.01	0.04	0.04
Renewable Energy	1.18	6.20	7.38	0.24	1.27	1.51	0.02	0.13	0.15
Fire Management	1.58	8.28	9.85	0.61	3.19	3.80	0.06	0.32	0.38
Forest and Woodlands	1.60	8.39	9.98	0.50	2.61	3.10	0.05	0.26	0.31
Vegetation Management	0.05	0.27	0.32	0.01	0.04	0.04	0.00	0.00	0.00
OHVs	1,201.68	6,308.84	7,510.52	449.97	2,362.34	2,812.31	45.00	236.23	281.23
Project Year 2011 Total	**1,980.88**	**6,815.75**	**8,796.62**	**4,144.44**	**4,058.21**	**8,202.65**	**453.13**	**423.20**	**876.33**

	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_x			SO_x		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
Project Year 2020												
CBNG Development/Production	59.01	26.51	85.53	16.59	7.45	24.04	59.37	26.67	86.05	0.47	0.21	0.68
Natural Gas Development/Production	106.39	47.80	154.19	42.16	18.94	61.10	509.64	228.97	738.60	6.12	2.75	8.87
Oil Development/Production	68.85	30.93	99.78	20.34	9.14	29.47	407.38	183.03	590.41	53.87	24.20	78.07
Locatable Minerals	252.74	206.79	459.53	34.94	28.58	63.52	24.26	19.85	44.11	3.26	2.67	5.93
Salable Minerals	499.65	408.80	908.45	63.72	52.14	115.86	14.44	11.82	26.26	0.45	0.37	0.81
Coal Mine	601.69	52.32	654.01	139.59	12.14	151.73	467.97	40.69	508.66	17.55	1.53	19.07
Resource Roads	1.36	7.14	8.50	0.15	0.77	0.91	0.01	0.03	0.03	0.00	0.00	0.00
ROW Corridors	19.62	102.98	122.60	4.38	23.01	27.39	8.30	43.59	51.89	1.58	8.32	9.90
Livestock/Grazing	11.39	59.78	71.16	1.72	9.03	10.75	0.10	0.54	0.64	0.02	0.08	0.09
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	24.74	129.90	154.65	0.76	4.01	4.77	0.21	1.10	1.31	0.04	0.19	0.23
Forest and Woodlands	53.32	279.95	333.27	8.06	42.31	50.37	0.27	1.40	1.66	0.05	0.26	0.31
Vegetation Management	1.14	6.01	7.16	0.17	0.91	1.08	0.01	0.05	0.06	0.00	0.01	0.01
OHVs	17.76	93.26	111.02	17.76	93.26	111.02	8.35	43.85	52.20	0.00	0.00	0.00
Project Year 2020 Total	**1,717.67**	**1,452.18**	**3,169.85**	**350.34**	**301.67**	**652.02**	**1,500.31**	**601.58**	**2,101.89**	**83.40**	**40.58**	**123.97**

Table 4-33. Cumulative Annual Emissions Associated with Alternative D (Continued)

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAP		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2020									
CBNG Development/Production	99.90	44.88	144.79	48.97	22.00	70.97	33.80	15.18	48.98
Natural Gas Development/Production	585.21	262.92	848.13	4,180.16	1,878.04	6,058.21	430.66	193.49	624.15
Oil Development/Production	102.58	46.09	148.67	13.37	6.01	19.38	1.34	0.60	1.94
Locatable Minerals	80.92	66.20	147.12	11.60	9.49	21.09	1.16	0.95	2.11
Salable Minerals	10.30	8.43	18.73	1.71	1.40	3.10	0.17	0.14	0.31
Coal Mine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Resource Roads	0.00	0.01	0.01	0.00	0.01	0.02	0.00	0.00	0.00
ROW Corridors	19.88	104.34	124.22	4.90	25.72	30.62	0.49	2.57	3.06
Livestock/Grazing	0.21	1.09	1.29	0.06	0.30	0.35	0.01	0.03	0.04
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	1.33	6.97	8.29	0.43	2.26	2.69	0.04	0.23	0.27
Forest and Woodlands	1.38	7.24	8.62	0.29	1.54	1.83	0.03	0.15	0.18
Vegetation Management	0.05	0.27	0.32	0.01	0.03	0.04	0.00	0.00	0.00
OHVs	1,482.84	7,784.91	9,267.75	543.49	2,853.34	3,396.83	54.35	285.33	339.68
Project Year 2020 Total	**2,384.59**	**8,333.35**	**10,717.94**	**4,804.99**	**4,800.14**	**9,605.13**	**522.05**	**498.68**	**1,020.72**

BLM Bureau of Land Management
CBNG coalbed natural gas
CO carbon monoxide
HAP hazardous air pollutant
NO_x nitrogen oxides
OHV off-highway vehicles
PM_{10} particulate matter less than 10 microns in diameter
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
ROW rights-of-way
SO_x sulfur oxides
VOC volatile organic compound

Table 4-34. Cumulative Annual Emissions Associated with Alternative E (Preferred Alternative)

	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_x			SO_x		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
Project Year 2011												
CBNG Development/Production	48.91	21.97	70.89	15.20	6.83	22.03	60.30	27.09	87.39	0.47	0.21	0.68
Natural Gas Development/Production	91.06	40.91	131.97	35.07	15.76	50.83	430.41	193.37	623.78	5.85	2.63	8.48
Oil Development/Production	65.03	29.21	94.24	19.90	8.94	28.85	410.40	184.38	594.78	54.28	24.39	78.66
Locatable Minerals	185.74	151.97	337.71	25.74	21.06	46.81	20.81	17.03	37.84	2.41	1.97	4.37
Salable Minerals	368.65	301.63	670.28	47.17	38.60	85.77	16.48	13.48	29.96	0.33	0.27	0.60
Coal Mine	525.40	45.69	571.09	121.89	10.60	132.49	408.63	35.53	444.16	15.32	1.33	16.65
Resource Roads	1.36	7.16	8.52	0.15	0.78	0.93	0.08	0.41	0.49	0.00	0.00	0.00
ROW Corridors	19.56	102.69	122.25	4.48	23.51	27.99	12.01	63.07	75.08	1.57	8.23	9.80
Livestock/Grazing	11.40	59.87	71.27	1.74	9.12	10.85	0.62	3.27	3.89	0.02	0.08	0.09
Renewable Energy	88.54	464.86	553.40	13.37	70.17	83.54	1.72	9.03	10.76	0.06	0.32	0.39
Fire Management	24.76	129.98	154.74	0.78	4.08	4.86	0.68	3.56	4.24	0.04	0.19	0.23
Forest and Woodlands	39.31	206.35	245.66	5.95	31.23	37.18	0.32	1.68	2.00	0.04	0.19	0.23
Vegetation Management	1.15	6.01	7.16	0.17	0.91	1.08	0.02	0.08	0.10	0.00	0.01	0.01
OHVs	14.76	77.51	92.27	14.76	77.51	92.27	6.29	33.04	39.34	0.00	0.00	0.00
Project Year 2011 Total	**1,485.63**	**1,645.80**	**3,131.44**	**306.38**	**319.10**	**625.49**	**1,368.78**	**585.04**	**1,953.82**	**80.38**	**39.83**	**120.20**

	CO			VOC			HAP		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
Project Year 2011									
CBNG Development/Production	99.99	44.93	144.92	49.09	22.05	71.14	33.88	15.22	49.11
Natural Gas Development/Production	459.15	206.28	665.43	3,665.11	1,646.64	5,311.76	376.25	169.04	545.29
Oil Development/Production	103.27	46.40	149.66	13.44	6.04	19.48	1.34	0.60	1.95
Locatable Minerals	60.35	49.38	109.73	8.67	7.09	15.76	0.87	0.71	1.58
Salable Minerals	8.89	7.27	16.16	1.47	1.21	2.68	0.15	0.12	0.27
Coal Mine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Resource Roads	0.02	0.09	0.10	0.01	0.03	0.04	0.00	0.00	0.00

Table 4-34. Cumulative Annual Emissions Associated with Alternative E (Preferred Alternative) (Continued)

	Emissions (Tons per Year)								
	CO			VOC			HAP		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
Project Year 2011									
ROW Corridors	20.49	107.58	128.07	4.97	26.11	31.08	0.50	2.61	3.11
Livestock/Grazing	0.34	1.79	2.13	0.07	0.36	0.43	0.01	0.04	0.04
Renewable Energy	1.18	6.20	7.38	0.24	1.27	1.51	0.02	0.13	0.15
Fire Management	1.58	8.28	9.85	0.61	3.19	3.80	0.06	0.32	0.38
Forest and Woodlands	1.44	7.57	9.02	0.46	2.41	2.87	0.05	0.24	0.29
Vegetation Management	0.05	0.27	0.32	0.01	0.04	0.04	0.00	0.00	0.00
OHVs	1,201.68	6,308.84	7,510.52	449.97	2,362.34	2,812.31	45.00	236.23	281.23
Project Year 2011 Total	**1,958.43**	**6,794.87**	**8,753.30**	**4,194.12**	**4,078.79**	**8,272.90**	**458.12**	**425.27**	**883.39**

	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_x			SO_x		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
Project Year 2020												
CBNG Development/Production	59.12	26.56	85.67	16.61	7.46	24.07	59.42	26.70	86.12	0.47	0.21	0.68
Natural Gas Development/Production	107.05	48.09	155.14	42.40	19.05	61.44	512.58	230.29	742.87	6.17	2.77	8.95
Oil Development/Production	69.16	31.07	100.23	20.49	9.21	29.70	411.47	184.86	596.33	54.41	24.44	78.85
Locatable Minerals	185.65	151.89	337.54	25.65	20.99	46.64	17.90	14.65	32.55	2.41	1.97	4.37
Salable Minerals	368.47	301.47	669.94	46.99	38.44	85.43	10.66	8.72	19.38	0.33	0.27	0.60
Coal Mine	601.69	52.32	654.01	139.59	12.14	151.73	467.97	40.69	508.66	17.55	1.53	19.07
Resource Roads	1.36	7.14	8.50	0.15	0.77	0.91	0.01	0.03	0.03	0.00	0.00	0.00
ROW Corridors	19.42	101.96	121.38	4.34	22.78	27.12	8.22	43.16	51.38	1.57	8.23	9.80
Livestock/Grazing	11.39	59.78	71.16	1.72	9.03	10.75	0.10	0.54	0.64	0.02	0.08	0.09
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	24.74	129.90	154.65	0.76	4.01	4.77	0.21	1.10	1.31	0.04	0.19	0.23
Forest and Woodlands	39.30	206.33	245.63	5.95	31.21	37.16	0.20	1.08	1.28	0.04	0.19	0.23
Vegetation Management	1.14	6.01	7.16	0.17	0.91	1.08	0.01	0.05	0.06	0.00	0.01	0.01
OHVs	17.76	93.26	111.02	17.76	93.26	111.02	8.35	43.85	52.20	0.00	0.00	0.00
Project Year 2020 Total	**1,506.25**	**1,215.79**	**2,722.04**	**322.57**	**269.24**	**591.82**	**1,497.10**	**595.71**	**2,092.81**	**82.99**	**39.90**	**122.90**

Table 4-34. Cumulative Annual Emissions Associated with Alternative E (Preferred Alternative) (Continued)

	Emissions (Tons per Year)								
	CO			VOC			HAP		
Project Scenario/Resource	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**	**BLM**	**Non-BLM**	**Cumulative**
Project Year 2020									
CBNG Development/Production	99.96	44.91	144.87	49.00	22.01	71.01	33.82	15.19	49.01
Natural Gas Development/Production	587.92	264.14	852.05	4,198.89	1,886.46	6,085.34	432.59	194.35	626.94
Oil Development/Production	103.60	46.55	150.15	13.50	6.07	19.57	1.35	0.61	1.96
Locatable Minerals	59.71	48.85	108.57	8.56	7.00	15.56	0.86	0.70	1.56
Salable Minerals	7.60	6.22	13.82	1.26	1.03	2.29	0.13	0.10	0.23
Coal Mine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Resource Roads	0.00	0.01	0.01	0.00	0.01	0.02	0.00	0.00	0.00
ROW Corridors	19.68	103.31	122.99	4.85	25.47	30.32	0.49	2.55	3.03
Livestock/Grazing	0.21	1.09	1.29	0.06	0.30	0.35	0.01	0.03	0.04
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	1.33	6.97	8.29	0.43	2.26	2.69	0.04	0.23	0.27
Forest and Woodlands	1.23	6.43	7.66	0.26	1.35	1.60	0.03	0.13	0.16
Vegetation Management	0.05	0.27	0.32	0.01	0.03	0.04	0.00	0.00	0.00
OHVs	1,482.84	7,784.91	9,267.75	543.49	2,853.34	3,396.83	54.35	285.33	339.68
Project Year 2020 Total	**2,364.12**	**8,313.65**	**10,677.77**	**4,820.30**	**4,805.32**	**9,625.62**	**523.64**	**499.23**	**1,022.87**

BLM Bureau of Land Management
CBNG coalbed natural gas
CO carbon monoxide
HAP hazardous air pollutant
NO_x nitrogen oxides
OHV off-highway vehicles
PM_{10} particulate matter less than 10 microns in diameter
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
ROW rights-of-way
SO_x sulfur oxides
VOC volatile organic compound

CHAPTER 5
REFERENCES

This page intentionally left blank.

CHAPTER 5
REFERENCES

Adams, B., J. Carlson, D. Milner, T. Hood, B. Cairns, and P. Herzog. 2004. Beneficial Grazing Management Practices for Sage-Grouse (*Centrocercus urophasianus*) and Ecology of Silver Sagebrush (*Artemisia cana* Pursh subsp. *cana*) in Southeastern Alberta. Final Report. January.

APLIC and USFWS (Avian Power Lines Interaction Committee and U.S. Fish and Wildlife Service). 2005. Avian Protection Plan (APP) Guidelines. A Joint Document Prepared By The Edison Electric Institute's Avian Power Line Interaction Committee and U.S. Fish and Wildlife Service. April.

Bailey, R.G. 1995. Descriptions of the Ecoregions of the United States. 2nd Edition. Miscellaneous Publication No. 1391. U.S. Department of Agriculture. Washington, D.C.

Bartos, D.L. and R.B. Campbell. 1998. Decline in Quaking Aspen in the Interior West—Examples from Utah. Rangelands. 20(1): 17-24. Available on Internet: http://uvalde.tamu.edu/rangel/tocfeb98.htm.

Bauer, J. 2005. Personal communication between Jim Bauer, Bureau of Land Management, Casper Field Office and Science Applications International Corporation. September.

BEA (Bureau of Economic Analysis). 2005. Regional Economic Information System, 1969-2003. Bureau of Economic Analysis. Available on Internet: http://www.bea.doc.gov/bea/regional/reis/. Accessed September 7, 2005.

Beck, J.L. and D.L. Mitchell. 2000. Influences of Livestock Grazing on Sage Grouse Habitat. Wildlife Society Bulletin 28(4):993-1002.

Beetle, A.A. 1960. A Study of Sagebrush. Bulletin 368, University of Wyoming Agricultural Experiment Station. Laramie, Wyoming.

Beetle, A.A. and W.M. Johnson. 1982. Sagebrush in Wyoming. Bulletin 779, University of Wyoming Agricultural Experiment Station. Laramie, Wyoming.

Bennett, E. 2001. The Past, Present and Future Management of South Bighorns. Casper, Wyoming.

Bennett, E. 2004. Personal communication between E. Bennett, Bureau of Land Management, Casper Field Office and Tanja Butler-Melone, Science Applications International Corporation. July.

BLM (Bureau of Land Management). 1972a. Bates Creek Reservoir Habitat Management Plan. U.S. Department of the Interior, Bureau of Land Management.

BLM. 1972b. Bishop Waterfowl Habitat Management Plan. U.S. Department of the Interior, Bureau of Land Management.

BLM. 1973. Bates Creek Aquatic Habitat Management Plan. U.S. Department of the Interior, Bureau of Land Management.

BLM. 1974a. 33-Mile Reservoir Habitat Management Plan. U.S. Department of the Interior, Bureau of Land Management.

BLM. 1974b. Teal Marsh Reservoir Habitat Management Plan. U.S. Department of the Interior, Bureau of Land Management.

BLM. 1977. Memorandum from Platte River Resource Area Manager to District Manager, Casper. Deer Creek Horse Meeting. U.S. Department of the Interior, Bureau of Land Management. October 17, 1977.

BLM. 1978. Goldeneye Wildlife and Recreation Area, Recreation Management Plan. U.S. Department of the Interior, Bureau of Land Management, Casper District. March.

BLM. 1983. Ferris-Seminoe Habitat Management Plan WY-033-T-24. Prepared by J. Gregson, Medicine Bow Resource Area, Rawlins District. U.S. Department of the Interior, Bureau of Land Management. December.

BLM. 1985a. Platte River Resource Management Plan. Casper Field Office. U.S. Department of the Interior, Bureau of Land Management. Casper, Wyoming.

BLM. 1985b. Record of Decision for the Resource Management Plan/Final Environmental Impact Statement, Platte River Resource Area, Casper District. U.S. Department of the Interior, Bureau of Land Management. Casper, Wyoming.

BLM. 1985c. Resource Management Plan. Decision M1 Surface Disturbance Stipulations. U.S. Department of the Interior, Bureau of Land Management.

BLM. 1985d. Northwest Area Noxious Weed Control Program, Final Environmental Impact Statement. U.S. Department of the Interior, Bureau of Land Management. Washington, D.C.

BLM. 1986a. Oregon/Mormon Pioneer National Historic Trails Plan. U.S. Department of the Interior, Bureau of Land Management.

BLM. 1986b. Lander Resource Management Plan EIS. Lander Grazing Supplement 1986. U.S. Department of the Interior, Bureau of Land Management.

BLM. 1987. Lander Field Office Resource Management Plan. U.S. Department of the Interior, Bureau of Land Management. June.

BLM. 1988a. Washakie Resource Management Plan. U.S. Department of the Interior, Bureau of Land Management. December.

BLM. 1988b. Bolton Creek Action Plan. U.S. Department of the Interior, Bureau of Land Management.

BLM. 1990. BLM Manual 8160 – Native American Coordination and Consultation. U.S. Department of the Interior, Bureau of Land Management. January 26, 1990.

BLM. 1991. Riparian-Wetland Initiative for the 1990's. BLM/WO/GI-91/001+4340. U.S. Department of the Interior, Bureau of Land Management. September.

BLM. 1992a. Final Bald Eagle Habitat Management Plan for the Platte River Resource Area and Jackson Canyon ACEC. BLM Casper Field Office. U.S. Department of the Interior, Bureau of Land Management. Casper, Wyoming. May.

BLM. 1992b. Raptor Habitat Management. Fish and Wildlife 2000. National Strategy Plan Series. U.S. Department of the Interior, Bureau of Land Management. August.

BLM. 1992c. Nongame Migratory Bird Habitat Conservation Plan. Fish and Wildlife 2000. National Strategy Plan Series. U.S. Department of the Interior, Bureau of Land Management.

BLM. 1992d. Interpretive Prospectus for the South Bighorn/Red Wall Backcountry Byway. U.S. Department of the Interior, Bureau of Land Management. Unpublished.

BLM. 1992e. Upland Game Bird Habitat Management on the Rise. Fish and Wildlife 2000 National Strategy Plan Series. U.S. Department of the Interior, Bureau of Land Management. October.

BLM. 1993. Final Environmental Impact Statement, General Management Plan, Development Concept Plan, Interpretive Prospectus for the Fort Laramie National Historic Site. U.S. Department of the Interior, Bureau of Land Management. August.

BLM. 1994a. Decision Record and Finding of No Significant Impact for the Environmental Assessment Predatory Animal Damage Control on Public Lands. Campbell, Converse, Crook, Goshen, Johnson, Natrona, Niobrara, Platte, Sheridan, and Weston Counties, Wyoming. Proposed by: U.S. Department of Agriculture Animal and Plant Health Inspection Service. April.

BLM. 1994b. BLM Handbook 8160-1 – General Procedural Guidance for Native American Consultation. U.S. Department of the Interior, Bureau of Land Management. November 3, 1994.

BLM. 1995a. Laramie Bighorn Sheep Habitat Management Plan. U.S. Department of the Interior, Bureau of Land Management. June.

BLM. 1995b. Instruction Memorandum No. 95-135. Revised Master Memorandum of Understanding Between the Animal and Plant Health Inspection Service and the Bureau of Land Management. U.S. Department of the Interior, Bureau of Land Management. Washington, D.C. June.

BLM. 1996. Partners Against Weeds: An Action Plan for the Bureau of Land Management. U.S. Department of the Interior, Bureau of Land Management. Billings, Montana. January.

BLM. 1997a. Instruction Memorandum No. 97-141. Revision of Animal Damage Control (ADC) Manual 6830. U.S. Department of the Interior, Bureau of Land Management. Washington, D.C. June 12, 1997.

BLM. 1997b. Record of Decision for the Cave Gulch, Bullfrog, Waltman Natural Gas Development Project. U.S. Department of Interior, Bureau of Land Management. August.

BLM. 1998a. Riparian Area Management: A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas. Technical Reference 1737-15. U.S. Department of the Interior, Bureau of Land Management.

BLM. 1998b. Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming. U.S. Department of the Interior, Bureau of Land Management. January.

BLM. 1998c. Manual 8110 – Identifying Cultural Resources. U.S. Department of the Interior, Bureau of Land Management. Washington, D.C.

BLM. 2000a. Fiscal Year 2000 Evaluation of the Platte River RMP. U.S. Department of the Interior, Bureau of Land Management. Casper Field Office, Wyoming. September.

BLM. 2000b. Newcastle Field Office Resource Management Plan. U.S. Department of the Interior, Bureau of Land Management. August.

BLM. 2000c. Instruction Memorandum No. 2000-038. Draft National Memorandum of Understanding with APHIS-Wildlife Services. U.S. Department of the Interior, Bureau of Land Management. Washington, D.C. June.

BLM. 2000d. Instruction Memorandum No. 2000-182. Policy for Funding and Assessment of Abandoned Mine Land Water Quality Restoration Projects. U.S. Department of the Interior, Bureau of Land Management. Washington, D.C.

BLM. 2001a. Buffalo Field Office Resource Management Plan. U.S. Department of the Interior, Bureau of Land Management. April.

BLM. 2001b. National Management Strategy for Motorized Off-Highway Vehicle Use on Public Lands. U.S. Department of the Interior, Bureau of Land Management.

BLM. 2001c. Muddy Mountain Forest Health and Recovery Plan for Muddy Mountain Environmental Education Areas. Environmental Assessment WY-060-01-027. U.S. Department of the Interior, Bureau of Land Management. Washington, D.C.

BLM. 2001d. Manual 6840 – Special Status Species. U.S. Department of the Interior, Bureau of Land Management. Washington, D.C.

BLM. 2001e. Instruction Memorandum No. 2001-102, Grasshopper and Mormon Cricket Control Program Changes. U.S. Department of the Interior, Bureau of Land Management. March

BLM. 2002a. Fire Management Planning. BLM-IM-2002-034. U.S. Department of the Interior, Bureau of Land Management.

BLM. 2002b. Right-of-Way (ROW) Management-Land Use Planning. BLM-IM-2002-196. U.S. Department of the Interior, Bureau of Land Management. June.

BLM. 2002c. Surface Water Quality Technical Report. Powder River Basin Oil and Gas Project Final EIS and Proposed Plan Amendment. U.S. Department of the Interior, Bureau of Land Management. Buffalo Field Office. December 2002. Available on Internet: http://www.wy.blm.gov/nepa/prb-feis/surfacewatertech/surfacewater-techdoc.pdf. Accessed February 21, 2006.

BLM. 2002d. BLM Wyoming Sensitive Species Policy and List. Cheyenne, Wyoming. U.S. Department of the Interior, Bureau of Land Management. Updated: September 20, 2002.

BLM. 2002e. Instruction Memorandum No. WY-2002-164. Guidance to Address Environmental Justice in Land Use Plans and Related NEPA Documents. U.S. Department of the Interior, Bureau of Land Management. Washington D.C.

BLM. 2002f. Air Quality Impact Assessment for the Montana Final Statewide Oil and Gas EIS and Proposed Amendment of the Powder River and Billings Resource Management Plans and the Wyoming Final EIS and Planning Amendment for the Powder River Basin Oil and Gas Development Project. Technical Support Document. U.S. Department of the Interior, Bureau of Land Management.

BLM. 2003a. Integration of the EPCA Inventory Results into Land Use Planning and Energy Use Authorizations. BLM-IM-2003-137. U.S. Department of the Interior, Bureau of Land Management.

BLM. 2003b. Instruction Memorandum No. 2003-274. BLM Implementation of the Settlement of Utah v. Norton Regarding Wilderness Study. U.S. Department of the Interior, Bureau of Land Management. Washington, D.C. September 29, 2003.

BLM. 2003c. Instruction Memorandum No. 2003-275. Consideration of Wilderness Characteristics in Land Use Plans (Excluding Alaska). U.S. Department of the Interior, Bureau of Land Management. Washington, D.C. September 29, 2003.

BLM. 2003d. Final Summary of the Management Situation Analysis. U.S. Department of the Interior, Bureau of Land Management. Casper Field Office, Wyoming. November.

BLM. 2003e. Assessing the Potential for Renewable Energy on Public Lands. U.S. Department of the Interior, Bureau of Land Management. February.

BLM. 2003f. Final Environmental Impact Statement and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project. U.S. Department of the Interior, Bureau of Land Management. Wyoming State Office, Buffalo Field Office. Volumes 1 – 4 (WY-070-02-065). January.

BLM. 2003g. Proposed Plan Amendment. U.S. Department of the Interior, Bureau of Land Management. Buffalo Field Office. January.

BLM 2003h. BLM Manual H-8410-1- Visual Resource Inventory. U.S. Department of the Interior, Bureau of Land Management. Washington, D.C.

BLM. 2004a. Statement of Policy Regarding Sage-Grouse Management Definitions, and Use of Protective Stipulations, and Conditions of Approval. BLM-WO-IM-2004-057. U.S. Department of the Interior, Bureau of Land Management. August 16.

BLM. 2004b. Casper Field Office Final Scoping Report. U.S. Department of the Interior Bureau of Land Management. Casper Field Office, Wyoming. January.

BLM. 2004c. Mineral Occurrence and Development Potential Report. U.S. Department of the Interior, Bureau of Land Management. January.

BLM. 2004d. Eastern Wyoming Zone Fire Management Plan. U.S. Department of the Interior, Bureau of Land Management. Casper Field Office, Wyoming.

BLM. 2004e. Instruction Memorandum No. 2004-057. Statement of Policy Regarding Sage-Grouse Management Definitions, and Use of Protective Stipulations, and Conditions of Approval (COAs). U.S. Department of the Interior, Bureau of Land Management. Washington, D.C. August 16, 2004.

BLM. 2004f. Rawlins Field Office Draft Environmental Impact Statement for the Revised Resource Management Plan. U.S. Department of the Interior, Bureau of Land Management. December.

BLM. 2004g. Cultural Class I Regional Overview. U.S. Department of the Interior, Bureau of Land Management. Casper Field Office, Wyoming. June.

BLM. 2004h. Visual Resource Inventory for the Casper Field Office. U.S. Department of the Interior, Bureau of Land Management. March.

BLM. 2005a. Geographic Information System (GIS) Data.

BLM. 2005b. BLM Handbook H-1601-1 – Land Use Planning Handbook. U.S. Department of the Interior, Bureau of Land Management. March 11, 2005. Archive on file. Casper Field Office, Wyoming.

BLM. 2005c. Unpublished data provided by BLM resource specialists between September 2003 and October 2005.

BLM. 2005d. Instruction Memorandum No. 2005-14. Water Disposal and Land Application Disposal (LAD) in the Powder River Basin. U.S. Department of the Interior, Bureau of Land Management. Washington, D.C. Available on Internet: http://www.blm.gov/nhp/efoia/wy/2005im/wy2005-014.htm.

BLM. 2005e. Preliminary Final Reasonable Foreseeable Development Scenario for Geothermal. U.S. Department of the Interior, Bureau of Land Management. Casper Field Office, Wyoming. February, 1, 2005.

BLM. 2005f. Preliminary Final Reasonable Foreseeable Development Scenario for Oil and Gas. Prepared by Dean Stilwell and Fred Crockett, Reservoir Management Group. U.S. Department of the Interior, Bureau of Land Management. Casper Field Office, Wyoming. September.

BLM. 2005g. Best Management Practices for Oil and Gas Development on the Public Lands. U.S. Department of the Interior, Bureau of Land Management. Available on Internet: http://www.blm.gov/bmp/index.htm. Accessed September 18, 2005.

BLM. 2005h. Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States. FES 0511. U.S. Department of the Interior, Bureau of Land Management. June. Available on Internet: http://windeis.anl.gov/documents/fpeis/index.cfm.

BLM 2005i. Instruction Memorandum No. 2005-024, National Sage-Grouse Habitat Conservation Strategy. U.S. Department of the Interior, Bureau of Land Management. November 2004.

BLM 2006a. Draft Biological Assessment of the Casper Field Resource Management Plan. Casper, Wyoming.

BLM 2006b. Powder River Basin Coal Review. U.S. Department of the Interior, Bureau of Land Management. May. Available on the Internet: http://www.wy.blm.gov/minerals/coal/prb/prbdocs.htm.

BLM 2006c. Personal communication between Steve Wright, Bureau of Land Management and Linda Slone Bureau of Land Management. May 30, 2006.

BLM 2006d. Instruction Memorandum No. 2006-073, Weed-Free Seed Use on Lands Administered by the Bureau of Land Management. U.S. Department of the Interior, Bureau of Land Management. Washington, D.C.

BLS (Bureau of Labor Statistics). 2005a. Consumer Price Index – All Urban Consumers. U.S. City Average, All Items, 1982-1984=100, Series ID CUUR0000SA0. Bureau of Labor Statistics. Available on Internet: http://www.bls.gov/cpi/home.htm. Accessed September 7, 2005.

BLS. 2005b. Current Population Survey. National Unemployment Rate for 2004. Bureau of Labor Statistics. Available on Internet: http://www.bls.gov/cpi/home.htm. Accessed September 8, 2005.

BLS. 2005c. Local Area Unemployment Survey. Annual Average Unemployment for State and Counties. Bureau of Labor Statistics. Available on Internet: http://www.bls.gov/lau/. Accessed September 8, 2005.

Bock, C.E., V.A. Saab, T.D. Rich, and D.S. Dobkin. 1992. Effects of Livestock Grazing on Neotropical Migratory Landbirds in Western North America. Pages 296-309. In: Status and Management of Neotropical Migratory Birds. Edited by D.M. Finch and P.W., Stangel. Estes Park, Colorado. September 21-25, 1992.

Bowker, J.M., D.B.K. English, and H.K. Cordell. 1999. Projection of Outdoor Recreation Participation to 2050. *In:* Outdoor Recreation in American Life: A National Assessment of Demand and Supply Trends (H.K. Cordell, ed.). Campaign, IL: Sagamore Publishing.

Bowles, A.E. 1995. Responses of Wildlife to Noise. Pages 109-156. *In:* Wildlife and Recreationists Coexistence Through Management and Research. Island Press: Washington, D.C.

Boyd, H.A., J.A. Bauer, C.H. Gaskill, M.R. Holm, and R.G. Specht. 1989. Problems in Stratigraphic Nomenclature, Southwest Wyoming. *In:* Wyoming Geological Association Fortieth Field Conference Guidebook 1989 Gas Resources of Wyoming. J.L. Eisert Editor. Casper, Wyoming September 10-14, 1989.

Brattstrom, B.H. and M.C. Bondello. 1983. Effects of off-road vehicle noise on desert vertebrates. *In* R.H. Webb and H.G Wilshire, editors. Environmental effects of Off- Road Vehicles: Impacts and Management in Arid Regions. Springer-Verlag. New York, New York, USA.

Braun, C.E. 1998. Sage-Grouse Declines in Western North America: What are the Problems? Proceedings of the Western Association of State Fish and Wildlife Agencies 78:139-1560.

Braun, C.E. 2002. A Review of Sage-Grouse Habitat Needs and Sage-Grouse Management Issues for the Revision of the Bureau Of Land Management's Pinedale District Resource Management Plan. Prepared for The Wilderness Society, Wyoming Outdoor Council, and Greater Yellowstone Coalition by Grouse, Inc. Tucson, AZ.

Braun, C.E., T. Britt, and R.O. Wallestad. 1977. Guidelines for Maintenance of Sage-Grouse Habitats. Wildlife Society Bulletin 5(3):99-106.

Carpenter, L.H. and O.C. Wallmo. 1981. Habitat Evaluation and Management. *In:* O.C. Wallmo, editor. Mule and Black-Tailed Deer of North America. University of Nebraska Press, Lincoln, Nebraska.

Caplan, S. 2006a. Personal communication between Susan Caplan, Bureau of Land Management and Gary Bertolin, Science Applications International Corporation. March 15, 2006.

Caplan, S. 2006b. Personal communication between Susan Caplan, Bureau of Land Management and Gary Bertolin, Science Applications International Corporation. February 6, 2006.

Casper Mountain Steering Committee and Natrona County Planning Department. 1985. Casper Mountain Plan. August.

CEQ (Council on Environmental Quality). 1981. Scoping Guidance. Memorandum for General Counsels, NEPA Liaisons and Participants in Scoping. Council on Environmental Quality. Washington, D.C. April 30, 1981.

CEQ. 1997. Council on Environmental Quality Environmental Justice Guidance Under the National Environmental Policy Act.

CEQ. 2005. Guidance on the Consideration of Past Actions in Cumulative Effects Analysis. Council of Environmental Quality. June 24.

Cerovski, A., M. Gorges, T. Byer, K. Duffy, and D. Felley, editors. 2001. Wyoming Bird Conservation Plan, Version 1.0. Wyoming Partners in Flight. Wyoming Game and Fish Department. Lander, Wyoming.

Clary, W.P. and J.W. Kinney. 2000. Riparian-Fisheries Habitat Responses to Late Spring Cattle Grazing. *In:* U.S. Department of Agriculture, Forest Service Proceedings RMRS-P-13.

Cole, D.N. 1996. Wilderness Recreation in the United States–Trend in Use, Users, and Impacts. International Journal of Wilderness. Vol. 2. No. 3.

Connelly, J.W., M.A. Schroeder, A.R. Sands, and C.E. Braun. 2000. Guidelines to Manage Sage - Grouse Populations and their Habitats. Wildlife Society Bulletin 28(4):967-985.

Connelly, J.W., S.T. Knick, M.A. Schroeder, and S.J. Stiver. 2004. Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats. Western Association of Fish and Wildlife Agencies. Unpublished Report. Cheyenne, Wyoming.

Converse County Planning Commission. 2003. Converse County Land Use Plan. County of Converse, Wyoming.

CREG (Consensus Revenue Estimating Group). 2006. Wyoming State Government Revenue Forecast, Fiscal Year 2006 – Fiscal Year 2010. Available on Internet: http://eadiv.state.wy.us/CREG/GreenCREG.pdf, accessed March 7, 2006. January.

Ducks Unlimited. 2004. Ducks Unlimited's Conservation Plan.

Eastern Shoshone Tribe. 2004. Eastern Shoshone Tribe Community Environmental Profile. Available on Internet: www.mnisose.org/profiles/eshone.htm.

E-Composites. 2003. Global Wind Energy Market 2003-2010: Rapidly Growing Market Segment. Available on Internet: http://www.researchandmarkets.com/reports/227059. 02/04/2005.

Emry, R.J. 1973. Stratigraphy and Preliminary Biostratigraphy of the Flagstaff Rim Area, Natrona County, Wyoming. Smithsonian Contributions to Paleobiology SCP-18. July 17, 1973. Available on Internet: www.sipress.si.edu/contributions_series/titles_series/scp_0018.html.

Energy Atlas. 2004. Wyoming Renewable Energy Resources. Available on Internet: www.energyatlas.org. Accessed: February 3, 2005.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1 (Online Edition). US Army Corps of Engineers. Waterways Experiment Station. Vicksburg, Mississippi.

EPA (U.S. Environmental Protection Agency). 2003. MOBILE6 Vehicle Emission Modeling Software. U.S. Environmental Protection Agency. Available on Internet: http://www.epa.gov/otaq/m6.htm.

EPA. 2004. Draft NONROAD 2004 Model. U.S. Environmental Protection Agency. Available on Internet: http://www.epa.gov/otaq/nonrdmdl.htm.

EPCA (Energy Policy and Conservation Act). 2000. Energy Policy and Conservation Act Reauthorization and Strategic Petroleum Reserve Update. Energy Policy and Conservation Act. U.S. Environmental Protection Agency. December 13.

Faaborg, J., M. Brittingham, T. Donovan, and J. Blake. 1995. Habitat Fragmentation in the Temperate Zone. T. E. Martin and D. Finch, editors. Ecology and Management of Neotropical Migratory Birds: A Synthesis and Review of Critical Issues: 357-380. Oxford University Press, New York, New York.

Fertig, W. 1994. Status report on Gaura neomexicana ssp. coloradensis, a candidate threatened species. Bureau of Land Management. unpublished.

Fertig, W. 1998. Census of Colorado butterfly plant (*Gaura neomexicana* ssp. *coloradensis*) on F. E. Warren Air Force Base, 1997. Prepared for the US Air Force by the Wyoming Natural Diversity Database, Laramie, WY. 42 pp.

Fertig, W. 2000a. State Species Abstract, Wyoming Natural Diversity Database. *Artemisia porteri*, Porter's Sagebrush. Wyoming Natural Diversity Database. University of Wyoming. Laramie, Wyoming.

Fertig, W. 2000b. State Species Abstract, Wyoming Natural Diversity Database. *Cymopterus williamsii*, Williams' Water-Parsnip. Wyoming Natural Diversity Database. University of Wyoming. Laramie, Wyoming.

Fertig, W. 2000c. State Species Abstract, Wyoming Natural Diversity Database. *Guara neomexicana* ssp. *coloradensis*, Colorado butterfly plant. Wyoming Natural Diversity Database. University of Wyoming. Laramie, Wyoming.

Fertig, W. 2000d. State Species Abstract, Wyoming Natural Diversity Database. *Sphaeromeria simplex*, Laramie False Sagebrush. Wyoming Natural Diversity Database. University of Wyoming. Laramie, Wyoming.

Fertig, W. 2001a. State Species Abstract, Wyoming Natural Diversity Database. *Penstemon haydenii*, Blowout Penstemon. Wyoming Natural Diversity Database. University of Wyoming. Laramie, Wyoming.

Fertig, W. 2001b. State Species Abstract, Wyoming Natural Diversity Database. *Spiranthes diluvialis*, Ute Ladies'-tresses. Wyoming Natural Diversity Database. University of Wyoming. Laramie, Wyoming.

Fertig, W. 2004. State Species Abstract, Wyoming Natural Diversity Database. *Aquilegia laramiensis*, Laramie Columbine. Wyoming Natural Diversity Database. University of Wyoming. Laramie, Wyoming.

Fertig, W. No Date. State Species Abstract, Wyoming Natural Diversity Database. *Cleome multicaulis*, Many-stemmed Spider-flower. Wyoming Natural Diversity Database. University of Wyoming. Laramie, Wyoming.

Fifield, C. 2004. Personal communication between Charlie Fifield, Bureau of Land Management, Casper Field Office and Rich McEldowney, Science Applications International Corporation. July 19, 2004.

Fifield, C. 2006. Personal communication between Charlie Fifield, BLM Casper Field Office and Rob Fetter, Science Applications International Corporation. February 10, 2006.

Fischer, R.A., K.P. Reese, and J.W. Connelly. 1996. An Investigation on Fire Effects Within Xeric Sage-grouse brood habitat. Journal of Range Management 49(3):194-198.

Fitch, L. and B.W. Adams. 1998. Can Cows and Fish Coexist? Canadian Journal of Plant Science 78: 191-198.

Forman, R.T.T., D. Sperling, J.A. Bissonette, A.P. Clevenger, C.D. Cutshall, V.H. Dale, L. Fahrig, R. France, C.R. Goldman, K. Heanue, J.A. Jones, F.J. Swanson, T. Turrentine, and T.C. Winter. 2003. Road Ecology Science and Solutions. Island Press, Washington, D.C.

Furniss, M.J., S. Flanagan, and B. McFadin. 2000. Hydrologically-Connected Roads: An indicator of the Influence of Roads on Chronic Sedimentation, Surface Water Hydrology, and Exposure to Toxic Chemicals. *In:* Stream Notes. Stream Systems Technology Center, USDA Forest Service, Rocky Mountain Research Station. Fort Collins, Colorado. July. Available on Internet: http://www.stream.fs.fed.us/news/streamnt/jul00/jul00_2.htm#anchortop.

GAO (U.S. General Accounting Office). 2003. BLM Public Domain Lands: Volume of Timber Offered for Sale has Declined Substantially Since Fiscal Year 1990. U.S. General Accounting Office Report to Congressional Requesters. Government Accounting Office. June.

GAO. 2004. Renewable Energy: Wind Power's Contribution to Electric Power Generation and Impact on Farms and Rural Communities. Report Number GAO-04-756. U.S. General Accounting Office. September.

Gill Jr., R.E., P. Canevari, and E.H. Iversen. 1998. Eskimo curlew (*Numenius borealis*). In A. Poole and F. Gill, editors. The Birds of North America, No. 347. The Birds of North America, Inc. Philadelphia, Pennsylvania.

Goshen Association of Governments. 1977. Goshen County Land Use Plan. County of Goshen, Wyoming. Prepared by Oblinger-Smith Corporation. Denver, Colorado. December.

Grenvik, C. 2005. Personal communication between Craig Grenvik, Wyoming Department of Revenue, Mineral Tax Division and Rob Fetter, Science Applications International Corporation. February 1, 2005.

Haas, G. 2002. Parks and Recreation, May 2002. ORRRC at 40! Hindsight Perspective Expands Capacity. Outdoor Recreation Resources Review Commission. Available on Internet: http://www.findarticles.com/cf_0/m1145/5_37/86505437.

Hall, F.C. and L.D. Bryant. 1995. Herbaceous Stubble Height as a Warning of Impending Cattle Grazing Damage to Riparian Areas.

Hanify, C. 2006. Personal Communication with Chris Hanify, WDEQ AQD.

Heidel, B. 2003. Status of Nelson's Milkvetch (*Astragalus nelsonianus* Barneby) in Wyoming. Report prepared for the Bureau of Land Management by the Wyoming Natural Diversity Database. Laramie, Wyoming.

Heidel, B. 2005. Correlations between Colorado butterfly plant (*Gaura neomexicana* spp. *coloradoensis*), weeds and willow on F. E. Warren Air Force Base. Unpublished report prepared for F. E. Warren Air Force Base by the Wyoming Natural Diversity Database - University of Wyoming, Laramie, Wyoming.

Marriott, H.J. 1987. A report on the status of Gaura neomexicana ssp. coloradensis, a Candidate Threatened species.. US U.S. Fish & Wildlife Service by the Wyoming Natural Diversity Database, The Nature Conservancy.

Holloran, M.J., B.J. Heath, A.G. Lyon, S.J. Slater, J.L. Kuipers, and S.H. Anderson. 2005. Greater Sage-Grouse Nesting Habitat Selection and Success in Wyoming. Journal of Wildlife Management 69(2):638-649.

Howe, F.P., R.E. Norvell, and J.R. Parrish. 2004. Monitoring Avian Populations in Utah's Riparian Areas. Colorado Riparian Association 16th Annual Conference: Wildlife and Riparian Areas. October 13-15, 2004. Estes Park, Colorado.

Johnson, D.H. 2001. Habitat fragmentation effects on birds in grasslands and wetlands: A critique of our knowledge. Great Plains Research 11(2):211-213.

Kay, C.E. 1995. Browsing by Native Ungulates: Effects on Shrub And Seed Production in the Greater Yellowstone Ecosystem. *In:* Proceedings: wildland shrub and arid land restoration symposium; 1993 October 19-21; Las Vegas, NV. Gen. Tech. Rep. INT-GTR-315.

Keinath, D., B. Heidel and G.P. Beauvais. 2003. Wyoming Plant and Animal Species of Concern. Prepared by the Wyoming Natural Diversity Database. University of Wyoming. Laramie, Wyoming.

Keystone Center. 1991. Final Consensus Report of the Keystone Policy Dialogue on Biological Diversity on Federal Lands. Colorado. April.

Knight, D.H. 1994. Mountains and Plains, the Ecology of Wyoming Landscapes. Yale University Press, New Haven, Connecticut.

Knight, D.H. 2001. Summary: Aspen Decline in the West? *In:* U.S. Department of Agriculture, Forest Service Proceedings RMRS-P-18.

Knight, R.L., F.W. Smith, S.W. Buskirk, W.H. Romme, and W.L. Baker, eds. 2000. Forest Fragmentation in the Southern Rocky Mountains. University of Colorado Press, Boulder, Colorado.

Knopf, F.L., R.R. Johnson, T. Rich, F.B. Samson, and R.C. Szaro. 1988. Conservation of Riparian Ecosystems in the United States. Wilson Bulletin 100:272–284.

Kovalchik, B.L. and W. Elmore. 1992. Effects of Cattle Grazing Systems on Willow-Dominated Plant Associations in Central Oregon. *In*: Proceedings – Symposium on Ecology and Management of Riparian Shrub Communities. Sun Valley, Idaho. General Technical Report INT-289. Intermountain Research Station, U.S. Department of Agriculture, Forest Service. Odgen, Utah. May 29-31, 1991.

Kufeld, R.C., O.C. Wallmo, and C. Feddema. 1973. Foods of the Rocky Mountain Mule Deer. U.S. Forest Service Research Paper RM-111.

Kulakowski, D., T. Veblen, and S. Drinkwater. 2004. The Persistence of Quaking Aspen (*Populus tremuloides*) in the Grand Mesa Area, Colorado. Ecological Society of America. Ecological Applications 14(5):1603-1614.

Langner, L.L. and C.H. Father. 1994. Biological Diversity's Status and Trends in the United States. USFS-Rocky Mountain Forest and Range Experiment Station. Colorado. April.

Lusby, G.C. 1970. Hydrologic and Biotic Effects of Grazing Versus Nongrazing near Grand Junction, Colorado. Journal of Range Management 15:34-42.

Mac M., P. Opler, C. Puckett-Haecker, and P. Doran. 1998. Regional Trends of Biological Resources – Grasslands. Two vols. U.S. Department of the Interior, U.S. Geological Survey. Reston, Virginia.

Martin, N.S. 1970. Sagebrush Control Related to Habitat and Sage-grouse Occurrence. Journal of Wildlife Management 34(2):313-320.

McAninch, C.D., R.L. Hoover, and R.C. Kufeld. 1984. Silvicultural Treatments and their Effects on Wildlife. In: Managing Forested Lands for Wildlife. Colorado Division of Wildlife in cooperation with U.S. Department of Agriculture, Forest Service, Rocky Mountain Region. Denver, Colorado. Pages 211-243.

Meaney and Company. 2004. Draft report, Statewide Programmatic Biological Assessment: Black-footed Ferret (*Mustela nigripes*). Submitted to US. Department of Interior, Bureau of Land Management. Wyoming State Office. Cheyenne, Wyoming.

Meyer, J. 2005. Personal communication between Joe Meyer, Bureau of Land Management and Ellen Dietrich, Science Applications International Corporation. February 4, 2005.

Miller, S.G., R.L. Knight, and C.K. Miller. 1998. Influence of Recreational Trails on Breeding Bird Communities. Ecological Applications 8(1):162-169.

Moline B.R., R.R. Fletcher, and D.T. Taylor. 1991. Impact of Agriculture on Wyoming's Economy. Laramie, WY: University of Wyoming, Cooperative Extension Service, Department of Economics, College of Agriculture. B-954. April.

Moline, A.B. 2004. Effect of Tamarisk and Russian Olive on Stream Invertebrate Communities. Colorado Riparian Association 16th Annual Conference: Wildlife and Riparian Areas. October 13-15, 2004. Estes Park, Colorado.

Molvar, E. 2001. Wild Wyoming. *In:* A Falcon Guide A Guide to Sixty Three Roadless Recreation Areas Including the Greater Yellowstone Ecosystem and the Red Desert.

Mueller, E., G. Gurin, and M. Wood. 2002. Chapter 2 The Demand. *In:* Outdoor Recreation in America. Parks and Recreation. April. Available on Internet: http://www.findarticles.com/cf_0/m1145/4_37/85882892.

National Research Council. 2005. Endangered and Threatened Species of the Platte River. National Academies Press, Washington, DC.

Nelle, P.J., K.P. Reese, and J.W. Connelly. 2000. Long-Term Effects of Fire on Sage-grouse Habitat. Journal of Range Management 53:586-591.

National Energy Policy Development Group. 2001. National Energy Policy. Washington D.C. May.

Natrona County Planning Commission. 1998. Natrona County Wyoming County Development Plan. Planning Consultant: Worthington, Lenhart and Carpenter. Land Use Task Force, Natrona County Planning Commission, Board of County Commissioners.

Nicholoff, S.H. 2003. Wyoming Partners in Flight Wyoming Bird Conservation Plan Version 2.0. Compiled by: S.H. Nicholoff, Wyoming Bird Conservation Plan Coordinator. May 1, 2003.

Noss, R.F. 1987. Protecting Natural Areas in Fragmented Landscapes. Natural Areas Journal 7(1):2-13.

NPS (National Park Service). 1981. Comprehensive Management Land Use Plan, Oregon Trail. National Park Service, National Historic Trail, MO-KS-NB-WY-ID-WA-OR. U.S. Department of the Interior. Government Printing Office, Washington, D.C.

NPS. 2006. Mandatory Class I Areas. Available on Internet: http://www2.nature.nps.gov/air/Maps/images/ClassIAreas.jpg

NRCS (Natural Resources Conservation Service). 1971. Soil Survey Goshen County, Wyoming, Southern Part. U.S. Department of Agriculture, Natural Resources Conservation Service. U.S. Government Printing Office. Washington, D.C. 96 pages plus maps.

NRCS. 1983. Soil Survey of Converse County, Wyoming, Northern Part. U.S. Department of Agriculture, Natural Resources Conservation Service. U.S. Government Printing Office. Washington, D.C. 184 pages plus maps.

NRCS. 1994. Soil Survey of Platte County, Wyoming. U.S. Department of Agriculture, Natural Resources Conservation Service. U.S. Government Printing Office. Washington, D.C. 595 pages plus maps.

NRCS. 1997. Soil Survey of Natrona County Area, Wyoming. U.S. Department of Agriculture, Natural Resources Conservation Service. U.S. Government Printing Office. Washington, D.C. 681 pages plus maps.

NREL (National Renewable Energy Laboratory). 2002. Wyoming Wind Power Resources. National Renewable Energy Laboratory. Available on Internet: www.windpowermaps.org. Accessed February, 3, 2005.

OMB (Office of Management and Budget). 2002. Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs. Office of Management and Budget. Circular A-94. Revised January 22, 2002. Available on Internet: http://www.whitehouse.gov/omb/circulars/.

Parrish, T.L, S.H. Anderson, A.W. Anderson, and S. Platt. 1994. Raptor Mitigation Handbook. Wyoming Cooperative Fishery and Wildlife Research Unit. July.

Paton, P.W. 1994. The Effect of Edge on Avian Nest Success: How Strong is the Evidence. Conservation Biology 8(1):17-26.

Priday, J. and B. Luce. 1995. Inventory of Bats and Bat Habitat Associated with Caves and Mines in Wyoming Completion Report. Wyoming Game and Fish Department, Bureau of Land Management, U.S. Forest Service-Shoshone National Forest, and U.S. Fish and Wildlife Service. April 14, 1994 - April 14, 1995.

Priday, J. and B. Luce. 1999. Inventory of Bats and Bat Habitat in Wyoming Completion Report. Wyoming Game and Fish Department, Bureau of Land Management, U.S. Forest Service-Shoshone National Forest, and U.S. Fish and Wildlife Service. April 15, 1998 - April 14, 1999.

Pyle, W.H. and J.A. Crawford. 1996. Availability of Foods of Sage Grouse Chicks Following Prescribed Fire in Sagebrush-Bitterbrush. Journal of Range Management 49(4):320-324.

Romaniello C., K. Rogers, W. Favinger, and J. Silvey. 2000. Analytical Methods for Estimating BLM's Share of Expenditures Generated by Big Game & Small Game Hunting, Fishing, and Wildlife Watching in Twelve Western States. Unpublished.

Russell, K.R. 1980. Mountain Lion. Pages 207-225. *In:* Big Game of North America. Ecology and Management a Wildlife Management Institute Book. Stackpole Books: Harrisburg, Pennsylvania.

Sauer, J.R., J.E. Hines, and J. Fallon. 2005. The North American Breeding Bird Survey, Results and Analysis 1966 - 2004. Version 2005.2. USGS Patuxent Wildlife Research Center. Laurel, MD.

Saunders, D., R.J. Hobbs, and C.R. Margules. 1991. Biological Consequences of Ecosystem Fragmentation: A Review. Conservation Biology 5:18-32.

Schuler, R. 2005. Personal communication between Rick Schuler, Bureau of Land Management, Ken Henke, Bureau of Land Management and Jenny Lange, Science Applications International Corporation. September 8, 2005.

Seglund, A.E., A.E. Ernst, M. Grenier, B. Luce, A. Puchniak, and P. Schnurr. 2004. White-tailed Prairie Dog Conservation Assessment.

Short, H.L. 1981. Nutrition and Metabolism. *In:* Mule and Black-Tailed Deer of North America. O. C. Wallmo, Editor. University of Nebraska Press, Lincoln, Nebraska.

Sonoran Institute. 2003a. Population, Employment, Earnings and Personal Income Trends, Converse County, WY. Bozeman, Montana. Sonoran Institute.

Sonoran Institute. 2003b. Population, Employment, Earnings and Personal Income Trends, Goshen County, WY. Bozeman, Montana. Sonoran Institute.

Sonoran Institute. 2003c. Population, Employment, Earnings and Personal Income Trends, Natrona County, WY. Bozeman, Montana. Sonoran Institute.

Sonoran Institute. 2003d. Population, Employment, Earnings and Personal Income Trends, Platte County, WY. Bozeman, Montana. Sonoran Institute

Slater, S.J. and S.H. Anderson. 2004. Riparian Bird Communities of the Bighorn, North Platte and Powder Rivers. The Wildlife Society Wyoming Chapter Annual Meeting: Habitat Fragmentation Dubois, Wyoming. November 30-December 3, 2004.

Stamm, H. 1999. Washakie's Life and Times: A Biographical Sketch. The Wind River Historical Center. Available on Internet: www.windriverhistory.org/exhibits/washakie_2/life.htm.

Stamm, H. 2003. Treaty of 1868. The Wind River Historical Center. Dubois, Wyoming. Available on Internet: www.windriverhistory.org/archives/treaty_docs/treaty1868comm.html.

State of Wyoming. 2004. Wyoming Statute 9-4-601. Distribution and Use; Funds, Accounts, Cities and Towns Benefited; Exception for Bonus Payments. Available on Internet: http://legisweb.state.wy.us/statutes/titles/title09/c04a06.htm.

Storm, G.L. and W.M. Tzilkowski. 1982. Furbearer Population Dynamics: A Local and Regional Management Perspective. Pages 69-90. *In:* Midwest Furbearer Management. Proceeding of a Symposium held at the 43rd Midwestern Wildlife Conference. Wichita, Kansas. December 7-8, 1981.

Swenson, J.E., C.A. Simmons, and C.D. Eustace. 1987. Decrease of sage grouse *Centrocercus urophasianus* after Ploughing of Sagebrush steppe. Biological Conservation 41:125-132.

Tamarisk Coalition. 2003. Impact of Tamarisk Infestation on the Water Resources of Colorado. Prepared for the Colorado Department of Natural Resources Colorado Water Conservation Board. May 30, 2003.

Taylor, D.T. 2004. Personal communication between David T. Taylor, Department of Agricultural Economics, University of Wyoming and Rob Fetter, Science Applications International Corporation. August 17, 2004.

Taylor, D.T. and R.H. Coupal. 2000. The Cost of Rural Community Services in Wyoming. University of Wyoming, Department of Agricultural and Applied Economics. Laramie, Wyoming. June.

Temple, S.A. 1985. Ecological Principles of Wildlife Management. Pages 11-21. In: Management of Nongame Wildlife in the Midwest: A Developing Art. Edited by J.B. Hale, L.B. Best, and R.L. Clawson. Proceedings of a Symposium held at the 47th Midwest Fish and Wildlife Conference. Grand Rapids, Michigan. December 17, 1985.

Thorson, J. 2004. Personal communication between Jerry Thorson, National Agricultural Statistics Service, Wyoming State Office, and Rob Fetter, Science Applications International Corporation. July 6, 2004.

TNC (The Nature Conservancy). 2000. Species Management Abstract. Sharp-tailed Grouse (*Tympanuchus phasianellus*). The Nature Conservancy. Arlington, Virginia.

Towry, R.K., Jr. 1984. Wildlife Habitat Requirements. Pages 73-211. In: Managing Forested Lands for Wildlife. Colorado Division of Wildlife in cooperation with U.S. Department of Agriculture, Forest Service, Rocky Mountain Region. Denver, Colorado.

Trewartha, G.T. and L.H. Horn. 1980. An Introduction to Climate. McGraw-Hill, New York.

U.S. Census Bureau. 2002. 2000 Census of Population and Housing. Washington, D.C.

U.S. Census Bureau. 2005a. 2002 County Business Patterns (NAICS). Converse and Natrona Counties, Wyoming; Detail Breakout for NAICS sector 21----, Mining. Available on Internet: http://censtats.census.gov/cbpnaic/cbpnaic.shtml. Accessed September 8, 2005.

U.S. Census Bureau. 2005b. Annual Estimates of Housing Units for Counties in Wyoming: April 1, 2000 to July 1, 2004. Population Division. Available on Internet: http://eadiv.state.wy.us/pop/cty04hu-est.htm. Accessed September 7, 2005.

U.S. Census Bureau. 2005c. Wyoming Incorporated Place Population Estimates: April 1, 2000 to July 1, 2004. Population Division. Available on Internet: http://eadiv.state.wy.us/pop/SUB-04EST.xls. Accessed September 7, 2005.

USACE (U.S. Army Corps of Engineers). 1999. Indian Land Areas Judicially Established 1978. U.S. Army Corps of Engineers. Indian Land Areas for North and South Central. Available on Internet: www.wes.army.mil/el/ccspt/natamap/usa_pg.html.

USBM (U.S. Bureau of Mines). 1993. Availability of Federally Owned Minerals for Exploration and Development in Western States: Wyoming, 1990. Bureau of Mines Special Report.

USBR (U.S. Bureau of Reclamation). 1982. Reservoir Area Management Plan for Pathfinder. Bureau of Reclamation.

USBR and USFWS. 2003. Platte River Recovery Implementation Program Draft Environmental Impact Statement. Bureau of Reclamation. December.

USC (United States Congressional Senate). 2003. 108th Congress, 1st Session. H.R. 1904, Healthy Forest Restoration Act of 2003 [introduced in the U.S. House; 1 May 2003]. 108th Congressional Bills, GPO Access. 7 January 2003 < http://frwebgate.access.gpo.gov/cgi-bin/useftp.cgi?IPaddress=162.140.64.88&filename=h1904enr.txt&directory=/diskb/wais/data/108_cong_bills>.

USC. 2005. 109th Congress, 1st Session. H.R. 6, Energy Policy Act of 2005 [introduced in the U.S. Senate; 18 April 2005]. 109th Congressional Bills, GPO Access. 4 January 2005 < http://frwebgate.access.gpo.gov/cgi-bin/useftp.cgi?IPaddress=162.140.64.21&filename =h6enr.txt &directory=/diskb/wais/data/109_cong_bills>.

USDA (U.S. Department of Agriculture). 1999. 1997 Census of Agriculture. National Agricultural Statistics Service. U.S. Department of Agriculture. Washington, D.C.

USDA. 2004. 2002 Census of Agriculture. National Agricultural Statistics Service. Washington, D.C.

USDI (U.S. Department of the Interior). 1995. Departmental Manual. Intergovernmental Relations. Part 512: American Indian and Alaska Native Programs. Chapter 2: Departmental Responsibilities for Indian Trust Resources. U.S. Department of the Interior. December 1, 1995.

USDI. 2003. Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to their Development. U.S. Department of the Interior. January.

USFS (USDA-Forest Service). 2000. National Fire Plan.

USFS. 2001. Thunder Basin National Grassland Land and Resource Management Plan. U.S. Department of Agriculture, Forest Service.

USFS. 2003a. Healthy Forest Restoration Act. United States Department of Agriculture, Forest Service.

USFS. 2003b. Medicine Bow National Forest Revised Land and Resource Management Plan. U.S. Department of Agriculture, Forest Service.

USFS. 2003c. Forest Plan Best Management Plan Evaluation. Black Hills National Forest. U.S. Department of Agriculture, Forest Service. Custer, South Dakota. March.

USFS. 2004. Disturbed WEPP model. Interface v. 2004.02.18 by David Hall, Project Leader Bill Elliot. Rocky Mountain Research Station. U.S. Department of Agriculture, Forest Service. Moscow, Idaho. Available on Internet: http://forest.moscowfsl.wsu.edu/cgi-bin/fswepp/wd/weppdist.pl. Accessed 9/10/2004.

USFWS (U.S. Fish and Wildlife Service). 1978. Determination of Critical Habitat for the Whooping Crane. U.S. Fish and Wildlife Service. Federal Register 43(94):20938-20942.

USFWS. 1985. Interior Population of the Least Tern Determined to be Endangered. U.S. Fish and Wildlife Service. Federal Register 50(102):21784-21792.

USFWS. 1987. Endangered and threatened animals and plants; final rule to determine *Penstemon haydenii* (blowout penstemon) to be an endangered species.(U.S. Fish and Wildlife Service. Federal Register 52:32926-32929.

USFWS. 1989. Endangered and Threatened Animals and Plants; Determination of Threatened Status for Eastern and Western Prairie Fringed Orchids. U.S. Fish and Wildlife Service. Federal Register 54:39857-39863.

USFWS. 1992. Endangered and Threatened Animals and Plants; Final Rule to List the Plant Spiranthes diluvialis (Ute ladies'-tresses) as a threatened species. U.S. Fish and Wildlife Service. Federal Register 57:2048-2054.

USFWS. 1993. Pallid Sturgeon (*Scaphirhynchus albus*) Recovery Plan. U.S. Fish and Wildlife Service.

USFWS. 1996. *Platanthera praeclara* (western prairie fringed orchid) Recovery Plan. U.S. Fish and Wildlife Service. vi 101 pp. Fort Snelling, Minnesota

USFWS. 1996. Platte River Minor Water Depletion Biological Opinion.

USFWS. 2000a. Endangered and threatened animals and plants; Threatened status for the Colorado butterfly plant (*Gaura neomexicana* ssp. *coloradensis*) from Southeastern Wyoming, Northcentral Colorado, and extreme Western Nebraska. U.S. Fish and Wildlife Service. Federal Register 65:62302-62310.

USFWS. 2000b. 12-Month Finding for a Petition to List the Black-tailed Prairie Dog as Threatened. U.S. Fish and Wildlife Service. Federal Register 65(24):5476–5488.

USFWS. 2001. Final Determination of Critical Habitat for the Great Lakes Breeding Population of the Piping Plover. U.S. Fish and Wildlife Service. Federal Register 66(88):22938-22969.

USFWS. 2002a. Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances. Utah Field Office, Salt Lake City, Utah. U.S. Fish and Wildlife Service. Update prepared by L.A. Romin and J.A. Muck. January 2002.

USFWS. 2002b. Revised Intra-Service Section 7 Consultation for Federal Agency Actions Resulting in Minor Water Depletions to the Platte River System. U.S. Fish and Wildlife Service. March 2002.

USFWS. 2003a. Withdrawal of proposed rule to list the mountain plover as threatened. U.S. Fish and Wildlife Service. Federal Register 68(174):53083-53101.

USFWS. 2003b. Letter from Michael M. Long, Field Supervisor, U.S. Fish and Wildlife Service to James Murkin, Field Manager, Casper Field Office, regarding current species list for the Bureau of Land Management Casper Field Office. U.S. Fish and Wildlife Service. June 12, 2003.

USFWS. 2003c. Designated Critical Habitat for the Preble's Meadow Jumping Mouse (*Zapus hudsonius preblei*); Final rule. U.S. Fish and Wildlife Service. Federal Register 68(120): 37276-37332.

USFWS. 2004a. Pathfinder Interim Management Plan. U.S. Fish and Wildlife Service. December.

USFWS. 2004b. Endangered and threatened animals and plants; 90-day finding on a petition to delist the Ute ladies'-tresses orchid and initiation of a 5-year review. U.S. Fish and Wildlife Service. Federal Register 69:60605-60607.

USFWS. 2004c. Species List for the Casper Field Office. Memorandum from U.S. Department of the Interior, Fish and Wildlife Service to Mr. James Murkin, Field Manager, Bureau of Land Management, Casper Field Office, Wyoming. U.S. Fish and Wildlife Service. March 22, 2004.

USFWS. 2005a. Endangered and Threatened Animals and Plants; Designation of Critical Habitat for the Colorado Butterfly Plant. U.S. Fish and Wildlife Service. Federal Register 70:1940-1970.

USFWS. 2005b. Black-tailed Prairie Dog. U.S. Fish and Wildlife Service. Endangered Species Program. Available on Internet: http://mountain-prairie.fws.gov/species/mammals/btprairiedog/.

USGS (U.S. Geological Survey). 1996. Ground Water Atlas of the United States: Montana, North Dakota, South Dakota, Wyoming. U.S. Geological Survey. HA 730-I. Last revised May 6, 2002. Available on Internet: http://capp.water.usgs.gov/gwa/ch_i/I-text2.html. Accessed February 21, 2006.

USGS. 2003a. Physiographic Regions of the U.S. Geological Survey. U.S. Geological Survey. Last updated April 17, 2003. Available on Internet: http://tapestry.usgs.gov/physiogr/physio.html. Accessed February 15, 2005.

USGS. 2003b. Fire and Grazing Impacts on Plant Diversity and Alien Plant Invasions in the Southern Sierra Nevada. Publication Brief for Resource Managers, Western Ecological Research Center. U.S. Geological Survey. November.

USGS. 2004. Estimated Use of Water in the United States: County-Level Data for 2000. U.S. Geological Survey. July 15, 2004. Available on Internet: http://water.usgs.gov/watuse/data/2000/index.html. Accessed February 21, 2006.

USGS. 2005a. Water Resources Data: Calendar Year Streamflow Statistics. U.S. Geological Survey.

USGS. 2005b. Water Resources of the United States. Available on Internet: http://water.usgs.gov/. Accessed February 21, 2006.

Wallmo, O.C. 1980. Mule and Black-tailed Deer. Pages 31-41. In: Big Game of North America. Ecology and Management a Wildlife Management Institute Book. Stackpole Books: Harrisburg, Pennsylvania.

Western Regional Climate Center. 2006. Casper WSO AP, Wyoming (481570), Period of Record Monthly Climate Summary - Period of Record 8/ 1/1948 to 9/30/2004. Available on Internet: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?wycasp. Accessed winter 2006.

WGFD (Wyoming Game and Fish Department). 1994. Black Bear Management Plan. Wyoming Game and Fish Department.

WGFD. 1998. Basin Management Plan. Basin: North Platte River, Gray Reef Dam to Goose Egg Bridge. Wyoming Game and Fish Department.

WGFD. 1999. Improving Streamside Wildlife Habitats. Habitat Extension Bulletin No. 9. Wyoming Game and Fish Department.

WGFD. 2002. Annual Report 2002. Wyoming Game and Fish Department.

WGFD. 2003. Determining the Value of Wildlife Associated Recreation per U.S. Bureau of Land Management Field Office Region in Wyoming. Wyoming Game and Fish Department.

WGFD. 2004a. Annual Report Strategic Habitat Plan Accomplishments. Wyoming Game and Fish Department.

WGFD. 2004b. Recommendations for Development of Oil and Gas Resources within Crucial and Important Wildlife Habitats. Wyoming Game and Fish Department. December 6, 2004.

WGFD. 2004c. Atlas of Birds, Mammals, Amphibians and Reptiles in Wyoming. Wildlife Division. July. Wyoming Game and Fish Department.

WGFD. 2004d. Letter to Linda Slone, Bureau of Land Management, Casper Field Office, Wyoming about ACECs. January 8, 2004. Wyoming Game and Fish Department.

WGFD. 2005a. Resource Management Plan Population Data and Management Challenges.

WGFD. 2005b. Interagency Memorandum: Chapter 3 – Big and Trophy Game. Wyoming Game and Fish Department, Casper Region. Wyoming Game and Fish Department.

WGFD. 2005c. Table of Raptors and Nongame Birds Occurring in the Casper Planning Area. Input for Casper Resource Management Plan Revision. Wyoming Game and Fish Department.

WGFD. 2005d. Table of Nongame Mammals Occurring in the Casper Planning Area. Input for Casper Resource Management Plan Revision. Wyoming Game and Fish Department.

WGFD. 2005e. Greater Sage-Grouse Assessment Input to Bureau of Land Management Casper Field Office Resource Management Plan Revision. Wyoming Game and Fish Department.

WGFD. 2005f. Black-Footed Ferret Complex Map Input Bureau of Land Management Casper Field Office Resource Management Plan Revision. Shape Files. Wyoming Game and Fish Department.

WGFD and BLM. 1990. Umbrella Memorandum of Understanding Between Wyoming Game and Fish Department and U.S. Department of the Interior Bureau of Land Management (Wyoming) For Management of the Fish and Wildlife Resources on the Public Lands. Wyoming Game and Fish Department and Bureau of Land Management. March.

Wilcove, D.S., D. Rothstein, J. Bubow, A. Phillips, and E. Losos. 1998. Quantifying Threats to Imperiled Species in the United States. *BioScience* 48(8): 607-615.

Wilson, D.E. and S. Ruff, editor. 1999. The Smithsonian Book of North American Mammals. Smithsonian Institution Press, Washington, D.C.

Wishart, W. 1980. Bighorn Sheep. Pages 161-171. In: Big Game of North America. Ecology and Management a Wildlife Management Institute Book. Stackpole Books: Harrisburg, Pennsylvania.

WLSO (Wyoming Legislative Service Office). 2003. Short Report: Background and Framework for Business Taxation. Written by D.C. Richards and B.P. Farmer. Wyoming Legislative Service Office. Cheyenne, Wyoming.

WOGCC (Wyoming Oil and Gas Conservation Commission). 2005. Wyoming Oil and Gas Conservation Commission. Available on Internet: http://wogcc.state.wy.us/. Accessed February 24, 2005.

Wohl, E. 2004. Cumulative Effects on Rivers of 200 Years of Human Activity in the Colorado Front Range. Colorado Riparian Association 16th Annual Conference: Wildlife and Riparian Areas. Estes Park, Colorado. October 13-15, 2004.

Worthington, Lenhart, and Carpenter. 2004. 2004 Casper Mountain Land Use Plan, an Amendment to the 1998 Natrona County Development Plan. Natrona County Development Department, Casper, Wyoming. June 1, 2004.

Wright, S. 2005. Personal Communication between S. Wright, Bureau of Land Management and R.J. Henke, Science Applications International Corporation. September 22, 2005.

WSFD (Wyoming State Forestry Division). 2001. Wyoming Forest Health Report. Wyoming State Division of Forestry. August.

WSEO (Wyoming State Engineer's Office). 2001. Modified North Platte Decree. Available on Internet: http://seo.state.wy.us/PDF/Nebreska%20v.%20Wyoming%20-%20Modified%20North%20Platte%20Decree.pdf. Accessed February 21, 2006.

WSEO. 2006. Wyoming Water Rights Database: Well Locations. Wyoming State Engineer's Office. Available on Internet: http://seo.state.wy.us/wrdb/PS_WellLocation.aspx. Accessed February 21, 2006.

WUG (Western Utility Group). 1992. Western Regional Corridor Study. Western Utility Group.

Wyoming Agricultural Statistics Service. 2004a. Average Rates for Grazing Cattle on Private, Non-Irrigated Land: Wyoming and Selected Regions 1989-2003. Available on Internet: http://www.nass.usda.gov/wy/internet/farmnum-ecdata.htm. Accessed January 31, 2005.

Wyoming Agricultural Statistics Service. 2004b. Wyoming Agricultural Statistics 2003. Available on Internet: http://www.nass.usda.gov/wy/. Accessed February 2, 2005.

Wyoming DEQ (Wyoming Department of Environmental Quality). 2000. Memorandum on Permitting Generators in Coal Bed Methane (CBM). Wyoming Department of Environmental Quality, Air Quality Division. Available on Internet http://deq.state.wy.us/aqd/downloads/cbm/cbm-diesel.pdf.

Wyoming DEQ. 2001. Wyoming Surface Water Classification List. Available on Internet: http://deq.state.wy.us/wqd/watershed/surfacestandards/Downloads/Standards/2-3648-doc.pdf. Accessed February 21, 2006.

Wyoming DEQ. 2002a. Wyoming Surface Water Quality Standards - Implementation Policies for Antidegradation, Mixing Zones, Turbidity, Use Attainability Analysis. Wyoming Department of Environmental Quality.

Wyoming DEQ. 2002b. Water Quality Rules and Regulations, Chapter 1. Available on Internet: http://deq.state.wy.us/wqd/WQDrules/Chapter_01.pdf. Accessed February 21, 2006.

Wyoming DEQ. 2003. Wyoming's Long Term Strategy for Visibility Protection, 2003 Review Report, Appendix G. Wyoming Department of Environmental Quality-Air Quality Division. Available on Internet: http://deq.state.wy.us/aqd/prop/2003%20LTSReview.pdf.

Wyoming DEQ. 2004b. Wyoming's 2004 305(b) State Water Quality Assessment Report and 2004 303(d) List of Waters Requiring TMDLs. June.

Wyoming DOR (Wyoming Department of Revenue). 2001a. Property Tax System in Wyoming. Wyoming Department of Revenue. Available on Internet: http://revenue.state.wy.us/PortalVBVS/uploads/propertytaxsystem.pdf. Accessed July 9, 2004.

Wyoming DOR. 2001b. Severance Tax Rates. Wyoming Department of Revenue. Available on Internet: http://revenue.state.wy.us/. Accessed July 9, 2004.

Wyoming DOR. 2004. Wyoming Department of Revenue. Joint Report of Operations: Severance Tax Incentives for Oil, Gas, Uranium and Coal, Fiscal Year 2004. Wyoming Department of Revenue - Mineral Tax Division and Wyoming Oil and Gas Conservation Commission. Wyoming Department of Revenue. Available on Internet: http://revenue.state.wy.us/PortalVBVS/uploads/2004%20OIL%20&%20GAS%20INCENTIVE%20RPT.pdf. Accessed January 31, 2005.

Wyoming DOR. 2005. Department of Revenue 2004 Annual Report. Online at http://revenue.state.wy.us/PortalVBVS/uploads/2004AnnualReport.pdf. Accessed July 27, 2005.

Wyoming DOT. (Wyoming Department of Transportation). 2004. FY 2005 State Transportation Improvement Program Summary.

Wyoming Geographic Information Science Center. 1998. Wyoming Ground Water Vulnerability Assessment Handbook. Spatial Data and Visualization Report 98-01. Editors: Jeffrey D. Hamerlinck and Christopher S. Arneson. Available on Internet: http://www.sdvc.uwyo.edu/groundwater/report.html. Accessed February 21, 2006.

Wyoming Sage-Grouse Working Group. 2003. Wyoming Greater Sage-Grouse Conservation Plan. June.

Wyoming State Office of Travel and Tourism. 2004. Wyoming Travel Industry: 2003 Impact Report.

Wyoming State Weed Team. 2003. Wyoming Weed Management Strategic Plan. June.

Wyoming Travel Industry. 2002. Wyoming Travel Industry 2001 Impact Report.

Wyoming Weed and Pest Council. 2005a. Wyoming Weed and Pest Control Act Designated List of Designated Noxious Weeds W.S. 11-5-102(a)(xi) and Prohibited Noxious Weeds W.S. 11-12-104. Available on Internet: www.wyoweed.org. Accessed September 3, 2005.

Wyoming Weed and Pest Council. 2005b. Declared List of Weeds and Pests: Wyoming Weed and Pest Control Act of 1973 W.S. 11-5-102(a)(vii) and W.S. 11-5-102(a)(viii). Available on Internet: www.wyoweed.org. Accessed September 3, 2005.

Yarmaloy, C., M. Bayer, and V. Geist. 1988. Behavior Responses and Reproduction of Mule Deer, Odocoileus hemionus, Does Following Experimental Harassment with an all-Terrain Vehicle. Canadian Field-Naturalist 102:425-429.

CHAPTER 6
LIST OF PREPARERS

This page intentionally left blank.

List of Preparers

Name	Education (degree, year, school)	Title	Project Role	Years of Experience
Bureau of Land Management				
Jim Murkin	BS Resource Management/Forestry, 1974, Oregon State University	Field Manager	Project oversight	31
Don Whyde	BS Forest Management, 1971, University of Montana	Assistant Field Manager - Resources	Project oversight	30
Joe Meyer	BS Watershed Management/ Resource Management, 1982, University of Wisconsin - Stevens Point	Assistant Field Manager - Resources	Project oversight Soils	22
Linda Slone	AS Paralegal/Natural Science and Math, 1994, Casper College	Planning and Environmental Coordinator	Project management, technical planning and NEPA procedural guidance and assistance; overall coordination with contractors, state government, and other cooperating agencies	24
Cindy Allen	BS Forestry, 1983, Mississippi State University	Forester	Forestry	17
Roy Allen	PhD Economics, 1976, Colorado State University	Economist	Economics reviewer	28
Chris Arthur	MA Anthropology, 1979, Colorado State University	Archeologist	Cultural resource specialist	31
Jim Bauer	BS Geology, 1977, University of North Dakota	Physical Scientist	Oil and gas, Salt Creek Hazardous Area ACEC, Wind River and Salt Creek SMAs	27
Eve Bennett	MS Zoology/Physiology, 2001, University of Wyoming; BS Natural Science/Mathematics and Biology, 1998, University of Wyoming	Outdoor Recreation Planner	Visual resource management, off-highway vehicles, recreation, SRMAs, North Platte River ACEC/SMA	6
Mike Brogan	BS Hydrology, 1979, Colorado State University	Hydrologist	Water resources	28
Sarah Bucklin-Comiskey	BS Biology, 1996, Montana State University	Wildlife Biologist	Wildlife	5
Susan Caplan	MS Air Resources Management, 1999, Colorado State University; BS Meteorology, 1984, San Jose State University	Physical Scientist	Climate and air quality	20
Lesley Collins	BA Journalism, 1997, University of Northern Colorado	Public Affairs Specialist	Public participation	5
Fred Crockett	MS Geology, 1971, University of Utah; BA Geology, 1969, University of Maine	Petroleum Geologist	Oil and gas RFD	27
Bill Daniels	MA Natural Resource Management, 1971, Texas A&M University	Senior Resource Specialist	State office coordinator	34
Tom Durst	PhD, Geology, 1976, Case Western Reserve University; MS Geology, 1972, Case Western Reserve University; BA Geology, 1969, University of South Dakota, Vermillion	Geologist	Geologic resources and minerals - locatables, salables, and other solid leasables	30
Charlie Fifield	BS Range Management, 1976, Montana State University BS Wildlife Management, 1975, Montana State University	Rangeland Management Specialist	Livestock grazing, vegetation, and riparian communities	28
Charlie Gaskill	MS Geology, 1977, University of Wyoming	Geologist	Coal management	28

List of Preparers

Name	Education (degree, year, school)	Title	Project Role	Years of Experience
Walt George	MS Zoology, 1979, University of Minnesota; BA Biology, 1975, Humboldt State University	Program Manager - Land Use Planning	State office oversight	29
Dale Hanson	MS Geology, 2000, University of Oregon	Regional Paleontologist	Paleontology and Alcova Fossil Area writer/reviewer	paleo - 4 yrs, BLM - 27 yrs
Ken Henke	BS Wildlife Biology, 1980, Arizona State University	State HAZMAT Program Lead	Health and safety	25
Mike Karbs	MS Public Policy and Regional Planning, 1979, University of Wisconsin – Madison; BS Mineral/Chemical Engineering, 1974, Colorado School of Mines	Assistant Field Manager; Solid Minerals	Technical reviewer for coal management	30
Patricia Karbs	Casper College	Writer-Editor	Writer-editor	23
Gary Long	BA Geography, 1970 University of Wyoming	Outdoor Recreation Planner	Visual resource management, off-highway vehicles, recreation, SRMAs, North Platte River ACEC/SMA, National Back Country Byways	28
Patrick Moore	MS Biology, 1980, Clarion University; BS Biology, 1970, Juniata College	Assistant Field Manager; Minerals and Lands	Technical reviewer for minerals and lands	26
Robin Nelson	AS Business, 1995, Casper College	GIS Specialist	GIS and map preparation	25
Bruce Parker	BS Range Management, 1989, University of Wyoming	Range Specialist/Weed Coordinator	Invasive, non-native plant species	15
Ken Schmid	MS Mathematics, 1993, Montana State University	Fire Management Officer	Fire and fuels	18
Celia Skillman	Casper College	Realty Specialist	Rights-of-way and corridors, renewable energy	28
George Soehn	BS, Wildlife Biology, 1989, Colorado State University	Natural Resource Specialist - Fire	Fire	14
Randy Sorenson	AS Business, 1992, Casper College	Realty Specialist	Lands and realty transportation	28
Bob Specht	BS Geology,1977, University of Wyoming	Minerals Geologist	Geologic resources and minerals - locatables, salables, and other solid leasables	Geologist - 26 BLM - 20
Dean Stilwell	MS Geology, 1978, University of Nebraska	Geologist	Oil and gas RFD, geologic resources, geothermal, and minerals – locatables, salables, and other solid leasables.	Geologist - 27 BLM - 25
Jim Wright	BS, 2000, University of Montana	Wildlife Biologist	Wildlife	6
Steve Wright	MBA, 2000, University of Wyoming; BS Mining Engineering, 1986, Colorado School of Mines	Mining Engineer	Coal management	18
Consultant				
Science Applications International Corporation (SAIC) – Interdisciplinary Team				

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Casper Field Office
2987 Prospector Drive
Casper, WY 82604-2968

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

PRIORITY MAIL

UNITED STATES POSTAGE AND FEES PAID
U.S. DEPARTMENT OF THE INTERIOR
PERMIT NO. G—76