Proposed Resource Management Plan and Final Environmental Impact Statement for the Buffalo Field Office Planning Area

Appendices

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

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APPENDICES

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Appendix A. Legislation and Policy Pertaining to Specific Resources

General Plans, Policies, and Regulations for All Resources
Council on Environmental Quality (CEQ) Final Guidance for Department and Agencies on the Appropriate Use of Mitigation and Monitoring (2011)
Bureau of Land Management (BLM) Land Use Planning Handbook, H-1601-1, updated March 11, 2005
BLM Instruction Memorandum 2014-146, Guidance on Preparing Federal Register Notices (2014)
BLM National Environmental Policy Act Handbook H-1790-1 (2008)
BLM Planning Regulations 40 Code of Federal Regulations (CFR) 1600
Instruction Memorandum 2013-137, Peer Review of Influential Scientific Information (2013)
Federal Land Policy and Management Act
National Environmental Policy Act
Physical Resources
Clean Air Act
Clean Water Act of 1977, as amended
BLM Air Resources Manual 7300
Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the BLM in the State of Wyoming (1998)
Mineral Resources
2006 Oil and Gas Surface Operating Standards and Guidelines (Gold Book, 4th edition)
Energy Policy Act of 2005 (P.L. 109-58)
43 CFR Parts 3100 (oil and gas), 3150 (geophysical), 3200 (geothermal), 3400 (coal), 3500 (other leasable solids), 3600 (salable), and 3800 (locatable) 43 CFR
BLM Manual 2880, Mineral Leasing Act Rights-of-Way, Glossary of Terms (2012)
BLM National Notice-to-Lessees
BLM Onshore Oil and Gas Orders
U.S. Department of the Interior Manual 3031601, Mineral Materials Disposals (2002)
U.S. Department of the Interior Manual 3031, Energy and Mineral Resource Assessments (1985)
Federal Coal Leasing Amendments Act of 1976. This act amended Section 2 of the Mineral Leasing Act of 1920 to require that all public lands available for coal leasing be offered competitively. Competitive leasing provides an opportunity for any qualified interested party to competitively bid for a federal coal lease.
Federal Oil and Gas Royalty Management Act of 1982
Federal Oil and Gas Royalty Simplification and Fairness Act of 1996
Federal Onshore Oil and Gas Leasing and Reform Act of 1987
General Mining Law of 1872. This law allowed the location of placer and lode mining claims, as well as patents, declaring "all valuable mineral deposits in lands belonging to the United States … to be free and open to exploration and purchase."
Integration of Best Management Practices into applications for permit to drill approvals and associated rights-of-way (ROW; WO IM 2007-021)
Instruction Memorandum WY 2005–14, Water Disposal and Land Application Disposal in the Powder River Basin. U.S. Department of the Interior, BLM (2005)
Instruction Memorandum 2013–101, Oil and Gas Leasing Reform (2013)
Materials Act of 1947 (as amended by the Surface Resources Act of 1955). Under this act, certain mineral and vegetative materials may be disposed of either through a contract of sale or a free-use permit. These mineral materials include common varieties of sand, stone, gravel, pumice, pumicite, cinders, and clay. This act also provides for free use of material by government agencies or municipalities, or non-profit organizations if not used for commercial purposes.
Surface Resources Act of July 23, 1955. This act removed sand, gravel, cinders, pumice, pumicite, and clay from locatable mineral classification, unless they have some type of uncommon characteristic.
Mineral Leasing Act for Acquired Lands of 1947, as amended. This act authorizes and governs mineral leasing on acquired lands. It provides that minerals on these lands are subject to the federal mineral leasing system, even though the commodity may be locatable or salable on other types of lands retained by the federal government.

Mineral Leasing Act of 1920, as amended. Under this law, the BLM issues leases for development of oil and gas, deposits of coal, phosphate, potash, sodium, sulfur and other leasable minerals on public domain lands and on lands having federally-reserved minerals.
Mining and Minerals Policy Act of 1970. This act identifies the continuing federal policy to foster and encourage private enterprise in the development of a stable domestic minerals industry, and the orderly and economic development of domestic mineral resources.
Petrified Wood Act of 1962. This act provides for free collection of limited amounts of petrified wood by the public, and for sale of larger quantities for commercial purposes.
Surface Mining Control and Reclamation Act of 1977. This law requires reclamation of surface coal mining operations, imposes bonding requirements, and set up the US Office of Surface Mining, also called the US Office of Surface Mining, Reclamation, and Enforcement, to oversee reclamation.
Unitization Handbook H-3180-1 (Exploratory)
Unitization Manual 3180 (Exploratory)
Fire and Fuels Management
The Interagency Prescribed Fire Planning and Implementation Procedures Guide (April 2014), with BLM Supplement (December 2013)
Federal Wildland Fire Management Policy and Program Review (1995 and 2001) (DOI and USDA 1995), and Guidance for the Implementation of Federal Wildland Fire Management Policy (February 2009)
Healthy Forest Restoration Act of 2003, which aids or directs the implementation of the goals of the: • National Fire Plan (2000) • 10-Year Comprehensive Strategy Implementation Plan (2001) • Community Wildfire Protection Plans
BLM Manual M-9211 – Fire Planning Manual (September 2012)
BLM Manual MS-1111 Fire Business Management
BLM Manual MS-9200 – Fire Program management (in final revision)
BLM Manual 9212 – Fire Prevention (in revision)
BLM Manual MS-9214 – Fuels Management
BLM Manual MS-9238 – Fire Trespass (in final revision)
BLM Manual MS-9400 – Aviation Management
BLM Handbook H-9212-1 – Fire Prevention Handbook
BLM Handbook H-9214-1 – Fuels Management Handbook
BLM Handbook H-9218-1 – Reports and Statistics Handbook
BLM Handbook H-9238-1 – Fire Trespass Handbook
BLM Handbook H-9211-1 – Fire Planning Handbook (September 2012)
Instruction Memorandum 2014–114, Sage-Grouse Habitat and Wildland Fire Management (2014)
Instruction Memorandum 2013–128, Sage-Grouse Conservation in Fire Operations and Fuels Management (2013) (supersedes IM 2011–138)
Interagency Fire Management Plan Template (2009)
Interagency Standards for Fire and Aviation Operations (published annually)
National Fire Plan (2000)
Protecting People and Natural Resources: A Cohesive Fuels Treatment Strategy (2006)
Secretary of the Interior. Secretarial Order 3336. Rangeland Fire Prevention, Management and Restoration. (2015)
U.S. Department of the Interior/U.S. Department of Agriculture Western Governors' Association, 2001; A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy and Implementation Plan (2001)
Biological Resources
Applicable federal and state laws that make the federal government responsible for control of weeds on federal lands and provide direction for their control.
Animal and Plant Health Inspection Service Plant Protection and Quarantine Memorandum of Understanding # 08-8100-0870-MU: Management of Grasshoppers and Mormon Crickets on Lands Subject to the Jurisdiction of the Department of the Interior
BLM Handbook H-4700-1, Wild Horses and Burros Management Handbook (2010)
BLM Manual 1737 – Riparian-Wetland Area Management (1992)
BLM Manual 1740-2 – Integrated Vegetation Management (2008)

BLM Manual 1745 – Introduction, Transplant, Augmentation, and Reestablishment of Fish, Wildlife, and Plants (1992)
BLM Manual 4180 – Land Health (2009)
BLM Manual 6500 – Wildlife and Fisheries Management (1988)
BLM Manual 6720 – Aquatic Resource Management (1991)
BLM Manual 6840 – Special Status Species Management (2008)
BLM Manual 7100 – Soil Classification
BLM Manual 9011 – Chemical Pest Control (1992)
BLM Manual 9014 – Use of Biological Control Agents of Pests on Public Lands (1990)
BLM Manual Manual 9015 –Management and Coordination of noxious weeds activities
BLM Handbook H-9011-1 –Chemical Pest Control (1988)
BLM regulations contained in 43 CFR 8200
BLM National Sage-Grouse Habitat Conservation Strategy (2004)
Carlson-Foley Act (P.L. 90-583)
Cave Resources Protection Act (16 United States Code [U.S.C.] 4301 et seq.)
CFR, Title 50, Section 402 (50 CFR 402), Interagency Cooperation: Endangered Species Act
Clean Water Act of 1977, as amended
Department of the Interior Manual 517 – Integrated Pest Management
Department of the Interior Manual 601, Mineral Materials Disposals (2007)
Emergency Wetlands Resources Act of 1986 (P.L. 99-645;100 Stat. 3582)
Endangered Species Act
Executive Order 11987, Exotic Organisms
Executive Order 11988, Floodplain Management
Executive Order 11990, Protection of Wetlands
Executive Order 13112, Establishment of the Invasive Species Council
Executive Order 13186, Migratory Birds
Executive Order 12962, Recreational Fisheries (June 7, 1995)
Executive Order 13112, Invasive Species Control
Federal Noxious Weed Act of 1974 (P.L. 93-629) (as amended by section 15 Management of Undesirable Plants on Federal Lands, 1990) (superseded by Plant Protection Act of 2000; Secs. 2801 to 2813 repealed)
Final Environmental Impact Statement: Vegetation Treatment on BLM Lands in the 13 Western States (1991)
Fish and Wildlife 2000 – National and state policies
Fish and Wildlife Conservation Act of 1980
Fish and Wildlife Management Act of 1956
Healthy Forests Act of 2003
Instruction Memorandum 2006–073, Weed-Free Seed Use on Lands Administered by the BLM (2006)
Instruction Memorandum 2009–018, Process for Setting Priorities for Issuing Grazing Permits and Leases (2009)
Instruction Memorandum 2010–012, Greater Sage-Grouse Habitat Management Policy on Wyoming BLM Administered Public Lands Including the Federal Mineral Estate (2010)
Instruction Memorandum 2010–013, Oil and Gas Leasing Screen for Greater Sage-Grouse (2010)
Instruction Memorandum 2010–022, Managing Structures for the Safety of Sage-Grouse, Sharp-tailed Grouse, and Lesser Prairie-chicken (2009)
Instruction Memorandum 2010–181, White-Nose Syndrome (2010)
Instruction Memorandum 2011–138, Sage-Grouse Conservation Related to Wildland Fire and Fuels Management (2011)
Instruction Memorandum 2012–019, Greater Sage-Grouse Habitat Management Policy on Wyoming BLM Administered Public Lands Including the Federal Mineral Estate (2012)
Instruction Memorandum 2012-035, Interim Guidance on Exploration and Site Characterization for Potential Carbon Dioxide Geologic Sequestration (2011)
Instruction Memorandum 2012-043, Greater Sage-Grouse Interim Management Policies and Procedures
Instruction Memorandum 2012–044, BLM National Greater Sage-Grouse Land Use Planning Strategy (2012)
Instruction Memorandum 2013-176, Seed Collection Policy and Pricing (2013)
Neotropical Migratory Bird Conservation Act (P.L. 106-247)
North American Wetlands Conservation Act, as amended (P.L. 101-233; 16 U.S.C. 4401)
Noxious Weed Control and Eradication Act of 2004 (P.L. 108-412)

Northwest Area Noxious Weed Control Program Environmental Impact Statement (1985)
Plant Protection Act of 2000 (P.L. 106-224) (supersedes Federal Noxious Weed Act of 1974 (7 U.S.C. 2801 et seq.) except for Sec. 2814)
Public Rangelands Improvement Act of 1978
Riparian Habitat, Interior Department Manual 520
Riparian-Wetlands Initiative for the 1990s, U.S. Department of the Interior, BLM, January 22, 1992
Sikes Act of 1960, as amended
Soil and Water Resources Conservation Act of 1977 (16 U.S.C. 2001 et seq.)
Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for the Public Lands Administered by the BLM in the State of Wyoming
Supplement to the Northwest Area Noxious Weed Control Program Final Environmental Impact Statement
Taylor Grazing Act of 1934 (43 U.S.C. 315)
The Bald and Golden Eagle Protection Act
The Migratory Bird Treaty Act
Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States Programmatic Environmental Impact Statement, 2007 and Final Programmatic Environmental Report
Water Quality Act of 1987, as amended from the Federal Water Pollution Control Act of 1977 (Clean Water Act) as amended (33 U.S.C. 1251 et seq.)
Wyoming Executive Order 2008–2, Greater Sage-Grouse Core Area Protection
Wyoming Executive Order 2010–4, Greater Sage-Grouse Core Area Protection (replaces Executive Order 2008–2)
Wyoming Executive Order 2011–5, Greater Sage-Grouse Core Area Protection (replaces Executive Order 2010–4)
Wyoming Executive Order 2013–3, Greater Sage-Grouse Core Area – Grazing Adjustments
Heritage and Visual Resources
36 CFR Part 60: National Register of Historic Places – Identifies processes for the identification and evaluation of historic properties for the National Register, and specifies procedures for listing properties on the National Register
36 CFR Part 78: Waiver of Federal Agency Responsibilities under Section 110 of the National Historic Preservation Act – Identifies limited circumstances when Agencies may waive responsibilities under Section 110 and procedures to follow
36 CFR Part 800: Protection of Historic Properties – Identifies processes and procedures for federal agencies to follow to be in compliance with Section 106 and 110 of the National Historic Preservation Act
43 CFR 8400 – Visual Resource Management
43 CFR Part 10: Native American Graves Protection and Repatriation Regulations – Identifies processes and procedures for federal agencies to follow to comply with the Native American Graves Protection and Repatriation Act
43 CFR Part 7: Protection of Archaeological Resources – Identifies processes and procedures for federal agencies to follow to comply with the Archaeological Resources Protection Act
American Indian Religious Freedom Act of 1978 (P.L. 95-431; 92 Stat. 469; 42 U.S.C. 1996)
Antiquities Act of 1906 (P.L. 59-209; 34 Stat. 225; 16 U.S.C. 432, 433)
Archaeological Resources Protection Act of 1979 (P.L. 96-95; 93 Stat. 721; 16 U.S.C. 47Oaa et seq.) as amended (P.L. 100-555; P.L. 100-588)
BLM Handbook H-8270-1, General Procedural Guidance for Paleontological Resource Management (1998)
BLM Handbook 8410-1, Visual Resource Inventory
BLM Information Bulletin No. 2002-101, Cultural Resource Considerations in Resource Management Plans
BLM Information Bulletins 98-135, 98-164, and 2000-096
BLM Manuals:
8100: Cultural Resource Management
8120: Tribal Consultation under Cultural Resources
8130: Planning For Uses of Cultural Resources
8140: Protecting Cultural Resources
8150: Permitting Uses of Cultural Resources
8170: Interpreting Cultural Resources for the Public
Buffalo Resource Area: Resource Management Plan/Record of Decision
Executive Order 11593 – Protection and Enhancement of the Cultural Environment
Executive Order 13007 – Providing for American Indian and Alaska Native Religious Freedom and Sacred Land Protections

Executive Order 13084 – Consultation and Coordination with Indian Tribal Governments
Historic Sites Act of 1935 (P.L. 74-292; 49 Stat. 666; 16 U.S.C. 461)
Instruction Memorandum 2002–096, Use of Visual Resource Management Class I Designation in Wilderness Study Area (2002)
Instruction Memorandum 2005–14, Water Disposal and Land Application Disposal in the Powder River Basin (2005)
Instruction Memorandum 2010–022, Managing Structures for the Safety of Sage-grouse, Sharp-tailed Grouse, and Lesser Prairie-chicken (2009)
Instruction Memorandum 2012–067, Clarification of Cultural Resource Considerations for Off-Highway Vehicle Designations and Travel Management (2012)
Instruction Memorandum 2012–140, Collecting Paleontological Resources Under the Paleontological Resources Preservation Act of 2009 (2012)
Instruction Memorandum 2012–141, Confidentiality of Paleontological Locality Information Under the Omnibus Public Lands Act of 2009 (2012)
National Historic Preservation Act of 1966 as amended (P.L. 89-665; 80 Stat. 915; 16 U.S.C. 470)
Native American Graves Protection and Repatriation Act of 1990 (P.L. 101-601; 104 Stat. 3048; 25 U.S.C. 3001)
Powder River Basin Oil and Gas Project Environmental Impact Statement and Proposed Plan Amendment
Programmatic Agreement Among BLM, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in which BLM will meet its Responsibilities Under the National Historic Preservation Act (1997)
Reservoir Salvage Act of 1960, as amended by Archeological and Historic Preservation Act of 1974 (P.L. 86-523; 74 Stat. 220, 221; 16 U.S.C. 469; P.L. 93-291; 88 Stat. 174; 16 U.S.C. 469)
State Protocol Agreement Between the Wyoming BLM State Director and the Wyoming State Historic Preservation Officer (2006)
Update to Buffalo Resource Area: Resource Management Plan/Record of Decision (2001)
Land Resources
40 CFR 2740, 2912, 2911, and 2920, Land Use Authorizations
43 CFR 2091
43 CFR 2930, Permits for Recreation on Public Lands
BLM Handbook H-8342, Travel and Transportation Handbook (2012)
BLM Handbook H-9600-1, Cadastral Survey Handbook
BLM Manual 1626 — Travel and Transportation and Management (2011)
BLM Manual 1740 — Renewable Resource Improvements and Treatments (2008)
BLM Manual H-2101–4 — Preacquistion Environmental Site Assessment (2000)
BLM Manual 2200–1 — Land Exchange Handbook (2005)
BLM Manual 6250 — National Scenic and Historic Trail Administration (2012)
BLM Manual 6280 — Management of National Scenic and Historic Trails and Trails Under Study or Recommended as Suitable for Congressional Designation (2012)
BLM Manual 6301 — Wilderness Characteristics Inventory (2011)
BLM Manual 6302 — Consideration of Lands with Wilderness Characteristics in the Land Use Planning Process (2011)
BLM Manual 6303 — Consideration of Lands with Wilderness Characteristics for Project-Level Decisions in Areas not Analyzed in Accordance with Manual 6302 (2011)
BLM Manual 6310 — Conducting Wilderness Characteristics Inventory on BLM Lands (2012)
BLM Manual 6320 — Considering Lands with Wilderness Characteristics in the BLM Land Use Planning Process (2012)
BLM Manual 6330 — Management of Wilderness Study Area (2012)
BLM Manual 6820 — Management of National Scenic and Historic Trails and Trails Under Study or Recommended as Suitable for Congressional Designation (2012)
BLM Manual 9113 — Roads Manual (1958)
BLM Manual 4180 – Rangeland Health Standards
BLM regulations contained in 43 CFR 4100 et seq.
BLM Wyoming Standards for Healthy Public Rangelands
Department of Interior Manual 600 DM 5, Standards for Federal Lands Boundary Evidence
Executive Order 12548 (1986): Establishment of annual fees for domestic livestock grazing on public rangelands
Federal Land Transfer Facilitation Act

Federal Land Policy and Management Act, Sections 102, 201, 202, 302, 304, 307, 309, 310, 401, 402, and 403
Hazardous Materials Transportation Act and Amendments
Interagency Ecological Site Handbook for Rangelands (2013)
Instruction Memorandum 2006–173, Travel and Transportation Management, Off-Highway Vehicle Management, Property, Engineering, Land Use Planning, and Lands and Realty (2006)
Instruction Memorandum 2008–014, Land Use Planning, Engineering, and All Resource Programs (2008)
Instruction Memorandum 2009–007, Process for Evaluating Status of Land Health and Making Determinations of Causal Factors When Land Health Standards Are Not Achieved (2009)
Instruction Memorandum 2009–043, Right-Of-Way Management, Wind Energy (2009)
Instruction Memorandum 2010–101, Oil and Gas Leasing Reform — Land Use Planning and Lease Parcel Reviews (2010)
Instruction Memorandum 2011–004, Transmittal of Revised Recreation and Visitor Services Land Use Planning Guidance (2011)
Instruction Memorandum 2011-154, Requirement to Conduct and Maintain Inventory Information for Wilderness Characteristics and to Consider Lands with Wilderness Characteristics in Land Use Plans (2011)
Instruction Memorandum 2012-032, Wyoming BLM Reclamation Policy (2012)
Instruction Memorandum 2012-169, Resource Management Plan Alternative Development for Livestock Grazing (2012)
Instruction Memorandum 2013-131, Guidance on Estimating Nonmarket Environmental Values (2013)
Memorandum of Agreement WY-7 between BLM and the Wyoming Recreation Commission, addresses land classifications and withdrawals to protect public lands generally, and specifically to protect historic trails.
Memorandum of Agreement WY-19 between BLM and the Wyoming Governor, addresses overall cooperation in public and state land management efforts
Memorandum of Agreement WY-20 between BLM and the Wyoming Game and Fish Commission, addresses a myriad of land and resource management issues, including classifications, land acquisition, disposal, and access
Memorandum of Agreement WY-21 between BLM and Region II and Region IV of the U.S. Forest Service, addresses overall coordination on a myriad of land and resource management issues
Memorandum of Agreement WY-63 between BLM, the U.S. Forest Service, Wyoming Department of Public Lands and the Wyoming Game and Fish Commission, addresses public land access and management of access problems
Memorandum of Agreement WY-65 between BLM and the Agricultural Stabilization and Conservation Service, addresses overall coordination on a myriad of land and resource management issues
Memorandum of Agreement WY-77 between BLM, the Agricultural Stabilization and Conservation Service, U.S. Forest Service, AES, and Wyoming State Conservation Commission, addresses overall coordination on conservation planning projects
Memorandum of Agreement WY-117 between BLM and the Wyoming Board of Land Commissioners, the Wyoming State Historic Preservation Office and the Advisory Council on Historic Preservation, addresses cultural resource protection in state exchanges
Memorandum of Agreement WY-118 between BLM and the Wyoming Board of Land Commissioners, addresses processing state exchanges
Memorandum of Agreement WY-119 between BLM and the Agricultural Stabilization and Conservation Service, addresses management of agricultural trespass
Memorandum of Agreement WY-121 between BLM and the National Park Service, addresses management of the Oregon National Historic Trails
Memorandum of Agreement WY-122 between BLM and the U.S. Forest Service, Wyoming Department of Public Lands, Wyoming Game and Fish Commission, Wyoming Recreation Commission, Wyoming Department of Agriculture, and the Wyoming Sate Planning Coordinator's Office, addresses access to public land
Memorandum of Agreement WY-131 between BLM and the Wyoming Game and Fish Department, addresses overall coordination on land and resource management
Memorandum of Agreement WY930-91-06-38 between BLM and the Wyoming Board of Land Commissioners, addresses exchange pooling
Memorandum of Agreement WY930-91-06-39 between BLM and the Wyoming Board of Land Commissioners, addresses exchange of state land in holdings in wilderness areas
Memorandum of Understanding between BLM and the Bureau of Reclamation addresses interaction and management of reclamation withdrawn lands
Omnibus Public Land Management Act of 2009 (P.L. 111–11)

Programmatic Agreement for historic preservation regarding how BLM will meet its responsibilities under the National Historic Preservation Act by Bob Bennett, BLM Wyoming State Director dated 03/08/2006
Public Rangelands Improvement Act of 1978 (P.L. 95-514)
Taylor Grazing Act of 1934
Transportation Safety Act of 1974
Special Designations
BLM Manual 1613, Areas of Critical Environmental Concern
BLM Manual 6400, Wild and Scenic Rivers (2012)
Socioeconomic Resources
Additional Guidance on the Treatment of Socioeconomic Issues in Land Use Plans, BLM IM-2002-167
American Folklife Preservation Act of 1976 (20 U.S.C. 2101)
American Indian Religious Freedom Act of 1978 (P.L. 95-341; 42 U.S.C. 1996 and 1996a)
Archaeological Resources Protection Act of 1979 (16 U.S.C. 470)
Civil Rights Act of 1964 (P.L. 88-352)
Clean Water Act of 1972, as amended (33 U.S.C. 1251 et seq.)
Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (42 U.S.C. 9601 et seq.)
Environmental Justice Guidance under National Environmental Policy Act
Emergency Planning and Community Right-to-Know Act of 1986
Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations
Executive Order 13006, Locating Federal Facilities on Historic Properties in Our Nation's Central Cities
Executive Order 13007, which mandates the protection and preservation of Indian religious practices
Executive Order 13148, Greening of the Government Through Leadership in Environmental Management, 2000
Executive Order 13175, Consultation and Coordination with Indian Tribal Governments
Federal Facilities Compliance Act of 1992 (P.L. 102-386)
Guidance on the Recommended Formats for Land Use Plans, Records of Decision, and Their Supporting Environmental Impact Statements, BLM IB-2002-056
Hazardous Materials Management, BLM Manual Section 1703
Instruction Memorandum 2002–164, Guidance to Address Environmental Justice in Land Use Plans and Related National Environmental Policy Act Document. (2002)
Indian General Allotment Act of 1887
Indian Mineral Development Act of 1982 (25 U.S.C. 2101 et seq.)
Indian Reorganization Act of 1934 (25 U.S.C. 461 et seq.)
Indian Self Determination and Education Assistance Act of 1975 (P.L. 93-658; 25 U.S.C. 450 et seq.)
Military Munitions and Explosives of Concern: A Handbook for Federal Land Managers with Emphasis on Unexploded Ordnance, Draft BLM Handbook H-1703-2
National Contingency Plan Regulations (40 CFR 300)
National Historic Preservation Act of 1966 (16 U.S.C. 470)
Native American Coordination and Consultation, BLM Manual 8160
Native American Graves Protection and Repatriation Act of 1990 (43 CFR 10)
Natural Resource Damage Assessment Regulations
Occupational Safety and Health Act of 1970 (29 U.S.C. 651 et seq.)
Oil Pollution Act of 1990 (33 U.S.C. 2715a)
Pre-acquisition Environmental Site Assessments, BLM Manual Handbook H-2101-4
Recreational and Public Purposes Act of 1926, as amended in 1988 (43 U.S.C. 869)
Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901 et seq.)
Rules applicable only within the State of Wyoming that have been adopted under the Surface Mining Control and Reclamation Act of 1977 (30 CFR 950)
Safe Water Drinking Act of 1974, as amended (42 U.S.C. 300 et seq.)
Secretarial Order 3206 for Implementing the Endangered Species Act
Surface Mining Control and Reclamation Act, Section 409 (P.L. 95-87, Section 401-C.1)
Use of the Economic Profile System in Planning, BLM IM 2003-169

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Appendix B. Greater Sage-Grouse Implementation Framework

Note: This appendix was revised following the release of the Buffalo Draft Resource Management Plan and Environmental Impact Statement.

Introduction

The Buffalo Resource Management Plan (RMP) provides specific goals, objectives, management actions, and required design features for the conservation of Greater Sage-Grouse in Wyoming. These are the commitments made to meet the federal agencies' national policy and direction for the conservation of Greater Sage-Grouse in light of the 2010 U.S. Fish and Wildlife Service (USFWS) listing decision as warranted but precluded from listing under the Endangered Species Act (ESA). Through the National Planning Strategy, Bureau of Land Management (BLM) and U.S. Forest Service (USFS) in coordination with USFWS have identified conservation measures to be included in the respective agencies' land use plans as the principal regulatory mechanisms to assure adequate conservation of the Greater Sage-Grouse and its habitat on public lands.

The measures identified in this RMP have been developed in coordination with not just the USFWS, but also the State of Wyoming, including the Wyoming Game and Fish Department (WGFD), and local cooperating agencies including conservation districts and counties.

Wyoming has established Core Population Areas to help delineate landscape planning units by distinguishing areas of high biological value. These areas are based on the locations of breeding areas and are intended to help balance Greater Sage-Grouse habitat requirements with demand for energy development (Doherty et al. 2011). The Proposed RMP is consistent with the Core Area Strategy, but contains additional restrictions to protect other resources, which results in added protections to Greater Sage-Grouse habitat and achieving conservation objectives identified in the COT Report on BLM-managed public lands. The COT Report indicates that the Core Area Strategy is a substantial regulatory mechanism that contributes to the conservation of Greater Sage-Grouse and balances the priorities of retaining a healthy Greater Sage-Grouse population on the landscape and energy development.

This appendix will introduce the framework for implementation of Greater Sage-Grouse conservation measures within the Buffalo Field Office. Implementation is a combination of permitting activities under the auspices of management direction provided in the Land Use Plan (LUP), undertaking specific activities in pursuit of the goals and objectives identified in the plan and monitoring of sage brush habitat and populations.

The implementation framework outlined here is focused specifically towards Greater Sage-Grouse and is reflective of how the national strategy will be assimilated into the existing statewide implementation efforts currently in place in Wyoming. This framework has been developed mindful of the varying scales at which implementation will be evaluated: at the local level to define successful conservation measures, at the state level to assess success of the statewide strategy, and across the species' range.

In 2013, the Director of USFWS tasked staff with the development of range-wide conservation objectives for the sage-grouse to define the degree to which threats need to be reduced or ameliorated to conserve sage-grouse so that it is no longer in danger of extinction or likely to

become in danger of extinction in the foreseeable future. Recognizing that state wildlife agencies have management expertise and management authority for sage-grouse, the USFWS created a Conservation Objectives Team (COT) of state and USFWS representatives to accomplish this task.

The COT conservation framework consisted of (1) identifying sage-grouse population and habitat status and threats, (2) defining a broad conservation goal, (3) identifying priority areas for conservation, and (4) developing specific conservation objectives and measures. The COT used three parameters—population and habitat representation, redundancy, and resilience (Shaffer and Stein 2010, Redford *et al.* 2011)—as guiding concepts in developing the conservation goal, priority areas for conservation, conservation objectives, and measures.

The COT report identified priority areas for Greater Sage-Grouse population habitats as Priority Areas for Conservation or (PACs). PACs are recognized as key areas across the landscape that are necessary to maintain redundant, representative, and resilient populations" of the species. The COT Report describes maintaining the integrity of PACs as "the essential foundation for sage-grouse conservation." PACs cover nearly 73 million acres across the west; within the Buffalo planning area, more than 1.2 million acres are considered priority habitat. Twenty-one percent of the priority habitat in the planning area is BLM-administered surface and 56 percent is BLM-administered minerals. Based upon 2007 lek counts and the population data contained in the COT Report, the Buffalo planning area contains an estimated four percent of the range-wide population of Greater Sage-Grouse (Table B.1, "Greater Sage-Grouse Habitat within the Buffalo Planning Area" (p. 1780)).

Table B.1. Greater Sage-Grouse Habitat within the Buffalo Planning Area

Populations/Subpopulations: ***Powder River Basin, Wyoming Portion, WAFWA Management Zone I (for the portion of the population that lies within the planning area; Wyoming 9-Plan (TBNG) removed)***				
Surface Estate	**Core Area Acres (%)**	**Connectivity Corridor Acres (%)**	**Priority Habitat Total (core + connectivity)**	**General Habitat Acres (%)**
Private	716,859 (79)	235,843 (85)	952,702 (81)	3,772,508 (79)
State	76,634 (8)	16,467 (6)	93,100 (8)	391,374 (8)
BLM	112,451 (12)	24,989 (9)	137,440 (12)	628,162 (13)
Other	0 (0)	0 (0)	0 (0)	12,736 (0.3)
Total	905,944	277,300	1,183,244	4,804,779
Fluid Mineral Estate	**Core Area Acres (%)**	**Connectivity Corridor Acres (%)**	**Priority Habitat Total (core + connectivity)**	**General Habitat Acres (%)**
Non-federal	385,488 (43)	122,886 (44)	508,375 (43)	2,189,675 (46)
BLM	520,456 (57)	154,413 (56)	674,869 (57)	2,615,104 (54)
Total	905,944	277,300	1,183,244	4,804,779
% percent BLM Bureau of Land Management TBNG Thunder Basin National Grassland WAFWA Western Association of Fish and Wildlife Agencies				

The conservation objectives identified in the COT Report, targeted at maintaining redundant, representative, and resilient sage-grouse habitats and populations, is the basis by which the Greater Sage-Grouse elements of the Buffalo Proposed RMP were developed. Due to the variability in ecological conditions and the nature of the threats across the range of the sage-grouse, developing detailed, prescriptive species or habitat actions was not attainable at the range-wide scale. Specific strategies and actions necessary to achieve the conservation objectives have been developed by

BLM and USFS in cooperation with State and local governments to ensure implementation of activities to meet the objectives identified in the COT report.

B.1. COT Objective 1: Stop Population Declines and Habitat Loss

> There is an urgent need to 'stop the bleeding' of continued population declines and habitat losses by acting immediately to eliminate or reduce the impacts contributing to population declines and range erosion. There are no populations within the range of sage-grouse that are immune to the threat of habitat loss and fragmentation. (COT Report, 2013)

The COT Report identified a series of threats to Greater Sage-Grouse habitat and the extent of those threats at the population scale. The management actions identified in the RMP were specifically designed to reduce the threats, as they were identified. The Buffalo RMP encompasses lands within Western Association of Fish and Wildlife Agencies (WAFWA) Management Zone I. To ensure that the threats are adequately addressed by the RMP, a strategy for reviewing activities and projects on public lands to determine the extent of their impact on Greater Sage-Grouse habitat has also been developed. The following outlines the process by which all activities on public lands will be reviewed.

The BLM/USFS will ensure that any activities or projects in Greater Sage-Grouse habitats would: (1) only occur in compliance with the Buffalo RMP Greater Sage-Grouse goals and objectives for priority management areas; and (2) maintain neutral or positive Greater Sage-Grouse population trends and habitat by avoiding, minimizing, and offsetting unavoidable impacts to assure a conservation gain at the scale of this land use plan and within Greater Sage-Grouse population areas, State boundaries, and WAFWA Management Zones through the application of mitigation for implementation-level decisions. The mitigation process will follow the regulations from the White House Council on Environmental Quality (CEQ) (40 CFR 1508.20; e.g., avoid, minimize, and compensate), hereafter referred to as the mitigation hierarchy, while also following Secretary of the Interior Order 3330 and consulting BLM, USFWS and other current and appropriate mitigation guidance. If it is determined that residual impacts to Greater Sage-Grouse from implementation-level actions would remain after applying avoidance and minimization measures to the extent possible, then compensatory mitigation projects will be used to offset residual impacts, or the project may be deferred or denied if necessary to achieve the goals and objectives for priority and general management areas in the Buffalo RMP.

To ensure that impacts from activities proposed in sage-grouse Core Areas are appropriately approved and mitigated as necessary, the BLM will apply mitigation measures and conservation actions and potentially modify the location, design, construction, and/or operation of proposed land uses or activities to comply with statutory requirements for environmental protection. The mitigation measures and conservation actions (Appendix D (p. 1863)) for proposed projects or activities in these areas will be identified as part of the National Environmental Policy Act (NEPA) environmental review process, through interdisciplinary analysis involving resource specialists, project proponents, government entities, landowners or other Surface Management Agencies. Those measures selected for implementation will be identified in the Record of Decision (ROD) or Decision Record (DR) for those authorizations and will inform a potential lessee, permittee, or operator of the requirements that must be met when using BLM-administered public lands and minerals to mitigate, per the mitigation hierarchy referenced above, impacts from the activity or project such that sage-grouse goals and objectives are met. Because these actions create a clear obligation for the BLM to ensure any proposed mitigation action adopted in

the environmental review process is performed, there is assurance that mitigation will lead to a reduction of environmental impacts in the implementation stage and include binding mechanisms for enforcement (CEQ Memorandum for Heads of Federal Departments and Agencies 2011).

To achieve the goals and objectives for Core Areas in the Buffalo Planning Area, the BLM will assess all proposed land uses or activities such as road, pipeline, communication tower, or powerline construction, fluid and solid mineral development, range improvements, and recreational activities proposed for location in Core Areas in a step-wise manner. The following steps identify a screening process for review of proposed activities or projects in these areas. This process will provide a consistent approach and ensure that authorization of these projects, if granted, will appropriately mitigate impacts and be consistent with the LUP goals and objectives for sage-grouse. The following steps provide for a sequential screening of proposals.

Table B.2. Implementation of RMP Decisions to Address COT Threats

COT Threat	Threat Extent	Program Area	RMP Decision	Imple-mentation Process	Tracking Mechanism
Sagebrush Elimination	Present but Localized	Fire and Fuels Management Grassland and Shrubland Communities Livestock Grazing Management			
Weeds/Annual Grasses	Present but Localized	Fire and Fuels Management Special Status Species Grassland and Shrubland Communities Invasive Species and Pest Management Rights-of-Way Travel and Transportation Management Recreation			
Energy	Present and Widespread	Soil Water/Riparian and Wetland Communities Leasables- Fluid Minerals Grassland and Shrubland Communities Invasive Species and Pest Management Wildlife Resources Special Status Species Visual Resources Rights-of-Way			
Fire	Present but Localized	Fire and Fuels Management Grassland and Shrubland Communities Livestock Grazing Management			
Grazing Range Management Structures	Present and Widespread	Livestock Grazing Management Special Status Species			
Free-Roaming Equids	Not Present	Wild Horse and Burro Management			

COT Threat	Threat Extent	Program Area	RMP Decision	Imple-mentation Process	Tracking Mechanism
Conifer Encroachment	Present but Localized	Fire and Fuels Management Grassland and Shrubland Communities Special Status Species			
Agriculture and Urbanization	Present but Localized	Lands and Realty			
Mining	Present and Widespread	Locatable Minerals Leasable Minerals- Coal Salable Minerals Soil Water/Riparian and Wetland Communities Invasive Species and Pest Management Wildlife Resources Special Status Species Visual Resources Rights-of-Way			
Recreation	Present and Widespread	Recreation Travel and Transportation Management			
Infrastructure	Present and Widespread	Rights-of-Way Soil Water/Riparian and Wetland Communities Invasive Species and Pest Management Wildlife Resources Special Status Species Visual Resources			
COT Conservation Objectives Team RMP Resource Management Plan					

B.1.1. Step 1 – Determine Proposal Adequacy

This screening process is initiated upon formal submittal of a proposal for authorization for use of BLM/USFS lands. The actual documentation of the proposal would include at a minimum a description of the location, scale of the project and timing of the disturbance. The acceptance of the proposal(s) for review would be consistent with existing protocol and procedures for each type of use. Evaluating consistency with (at a minimum) State sage-grouse regulations.

B.1.2. Step 2 – Evaluate Proposal Consistency with LUP

Step 2.1

The proposal will be reviewed to determine whether it would be allowed as prescribed in the Land Use Plan. For example, some activities or types of development are prohibited in sage-grouse habitat, such as wind developments in Priority Habitat. Evaluation of projects will also include an assessment of the current state of the Adaptive Management hard and soft triggers. If the

proposal is for an activity that is specifically prohibited, the applicant should be informed that the application is being rejected since it would not be allowed, regardless of the design of the project.

Step 2.2

The proposal will be reviewed to determine whether it conforms with the Density and Disturbance Limitations. If the proposed activity occurs within a Priority Habitat Management Area (PHMA), evaluate whether the disturbance from the activity exceeds the limit on the amount of disturbance allowed within the activity or project area (Density and Disturbance Calculation Tool [DDCT] process). If current disturbance within the activity area or the anticipated disturbance from the proposed activity exceeds this threshold, the project would be deferred until such time as the amount of disturbance within the area has been reduced below the threshold, redesigned so as to not result in any additional surface disturbance (collocation) or redesigned to move it outside of PHMA. Should the project be a result of a valid existing right, BLM will work to minimize the disturbance and determine any residual impacts that may require appropriate mitigation.

The maximum density of disruptive activities and surface disturbance allowed will be analyzed via the DDCT, and will be conducted by the Federal Land Management Agency on federal land and the project proponent on non-federal (private, state) land per the RMP 9 revision.

State Agency Permit is needed, without a need for a federal permit:

The first point of contact for addressing sage-grouse issues for any state permit application should be the WGFD. Project proponents (proponents) need to have a thorough description of their project and identify the potential effects on sage-grouse prior to submitting an application to the permitting agency. Project proponents should contact WGFD at least 45-60 days prior to submitting their application. More complex projects will require more time. It is understood that WGFD has a role of consultation, recommendation, and facilitation, and has no authority to either approve or deny the project. The purpose of the initial consultation with the WGFD is to become familiar with the project proposal and ensure the project proponent understands the DDCT and recommended stipulations.

Federal Agency Permit is needed, with or without a State permit:

When a project requires federal action prior to approval, the proponent should contact the federal agency responsible for reviewing the action. The federal agency and the proponent will determine the best process for completing the DDCT and receiving recommendations from WGFD. Project proponents (proponents) need to have a thorough description of their project and identify the potential effects on sage-grouse prior to submitting an application to the permitting agency.

Maximum Density and Disturbance Process

Density and Disturbance Calculation

The DDCT is a spatially based tool that calculates both the average density of disruptive activities and total surface disturbance within the area affected by the project, or DDCT assessment area. The DDCT assessment area is created based on buffers around proposed projects (first buffer) in protected sage-grouse core areas, and subsequent buffers around any occupied, core area leks within the first buffer. A four mile buffer is used to identify 75 percent of the sage-grouse use around a lek. All activities will be evaluated within the context of maximum allowable disturbance (disturbance percentages, location and number of disturbances) of suitable

sage-grouse habitat (see Appendix 1 of Wyoming Executive Order 2011-5 for definition of suitable sage-grouse habitat and disturbance of suitable sage-grouse habitat) within the DDCT assessment area. This tool allows for better siting of projects rather than averaging the density/disturbance calculation per section.

All lands within core area boundaries are is considered suitable habitat unless documented. Mapped unsuitable habitat is treated neither as suitable habitat, nor disturbance, which results in the area being removed from the DDCT assessment area altogether.

1. Density/Disturbance Calculation Tool (DDCT): Determine all occupied leks within a core population area that may be affected by the project by placing a four-mile boundary around the project boundary (as defined by the proposed area of disturbance related to the project) (see Figure B.1, "Four-Mile Buffer around the Proposed Project Boundary" (p. 1785)). All occupied leks located within the four-mile boundary and within a core population area will be considered in this assessment.

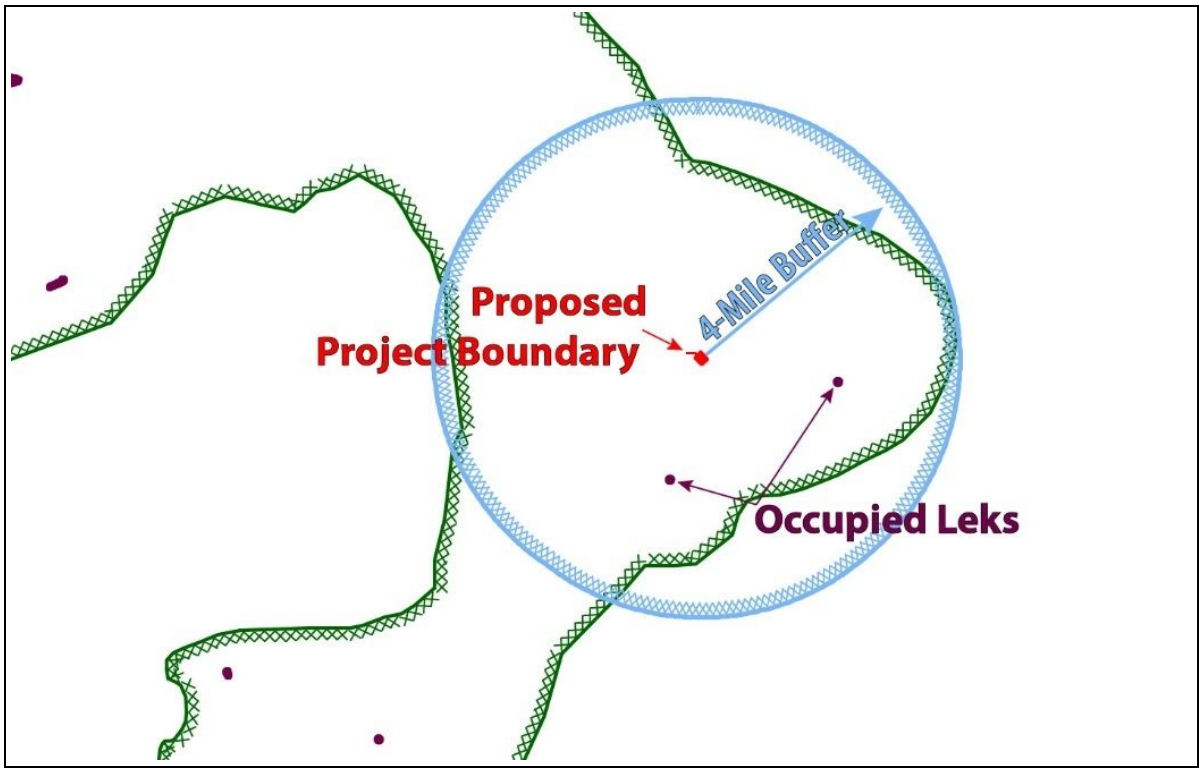


Figure B.1. Four-Mile Buffer around the Proposed Project Boundary

A four-mile boundary will then be placed around the perimeter of each of these lek(s) (see Figure B.2, "Four-Mile Boundary around Perimeter of Lek(s)" (p. 1785)).

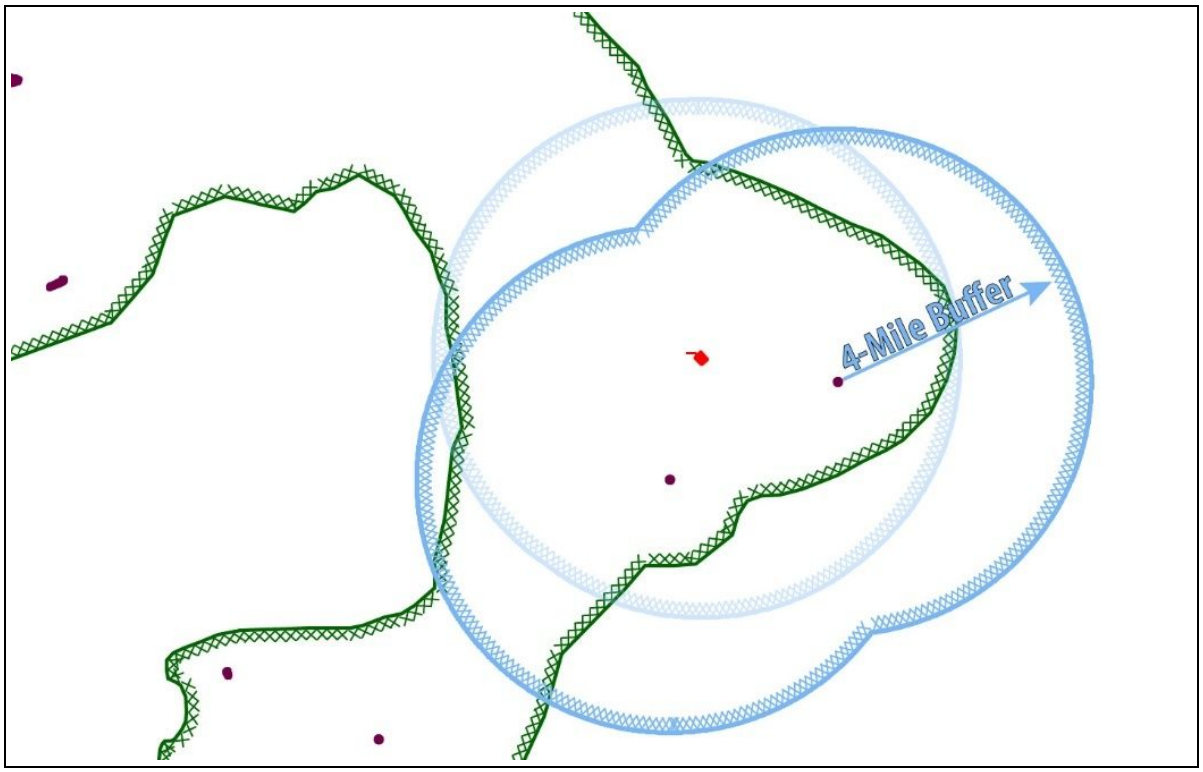


Figure B.2. Four-Mile Boundary around Perimeter of Lek(s)

The core population area within the combined four-mile buffer around both the leks and the project boundary creates the DDCT assessment area for each individual project (see Figure B.3, “DDCT Assessment Area” (p. 1786)).

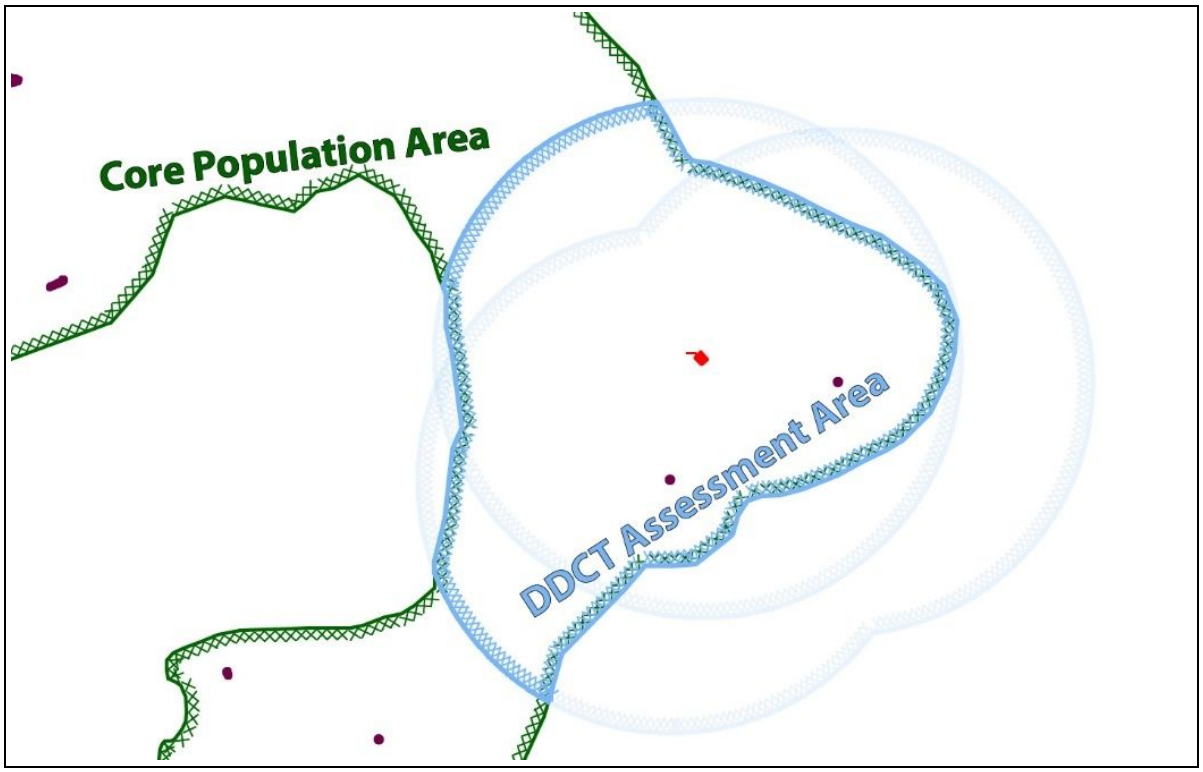
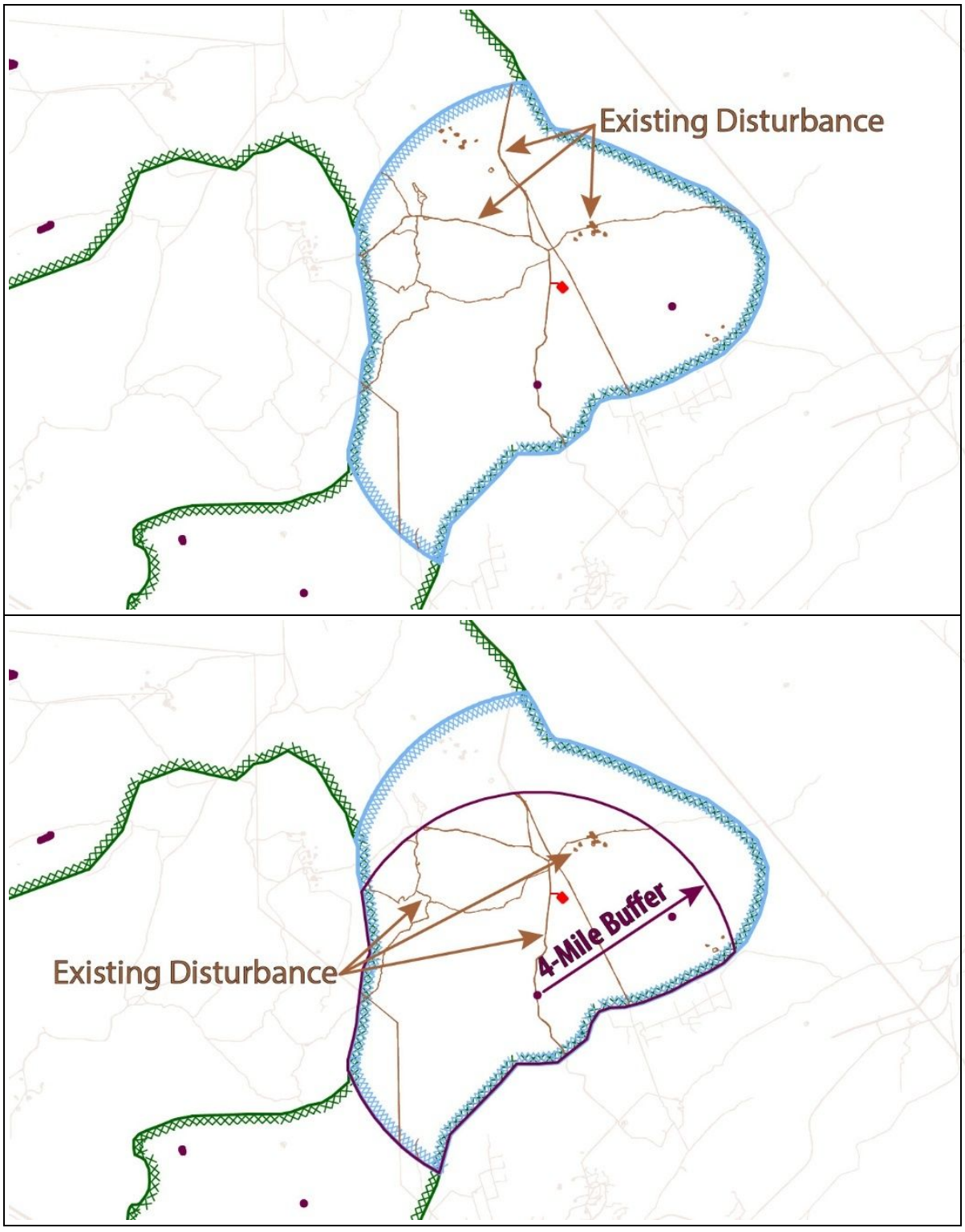


Figure B.3. DDCT Assessment Area

Disturbance will be analyzed for the DDCT assessment area as a whole and for each individual lek within the DDCT assessment area (see Figure B.4, "Existing Disturbance with Four-Mile Buffer" (p. 1788)).


Existing Disturbance
Existing Disturbance
4-Mile Buffer

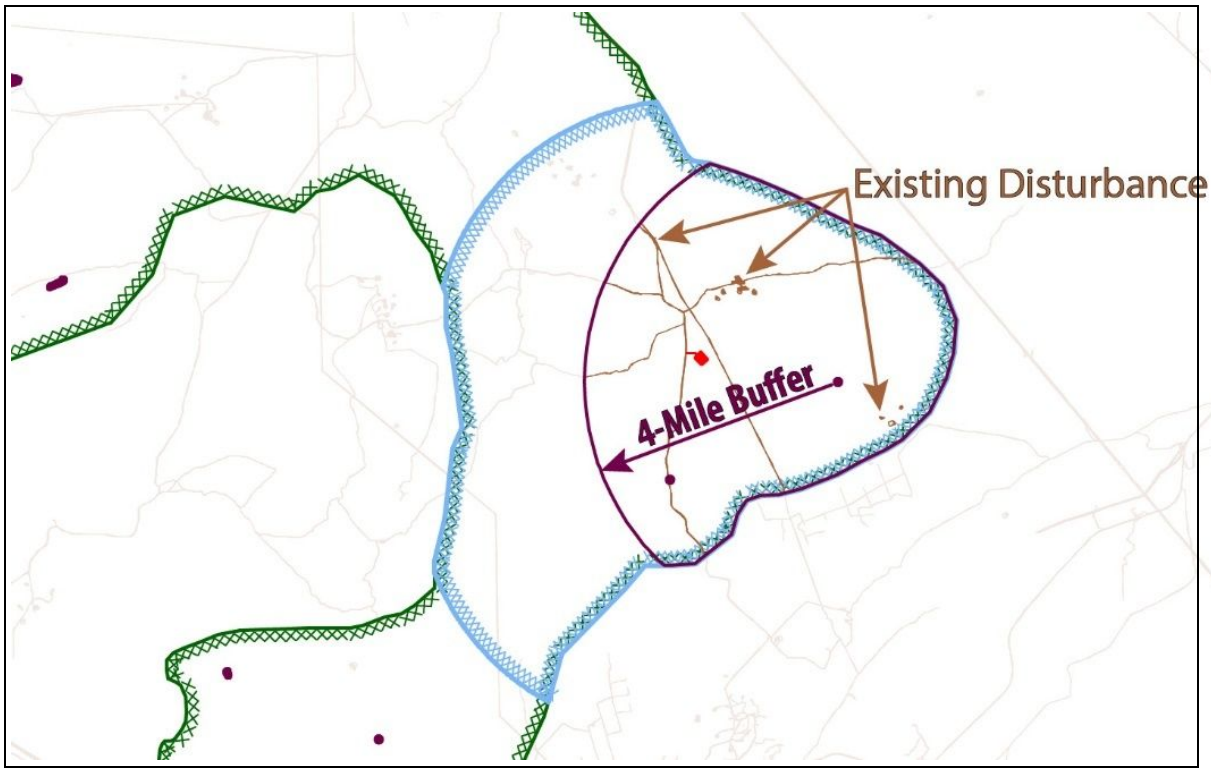
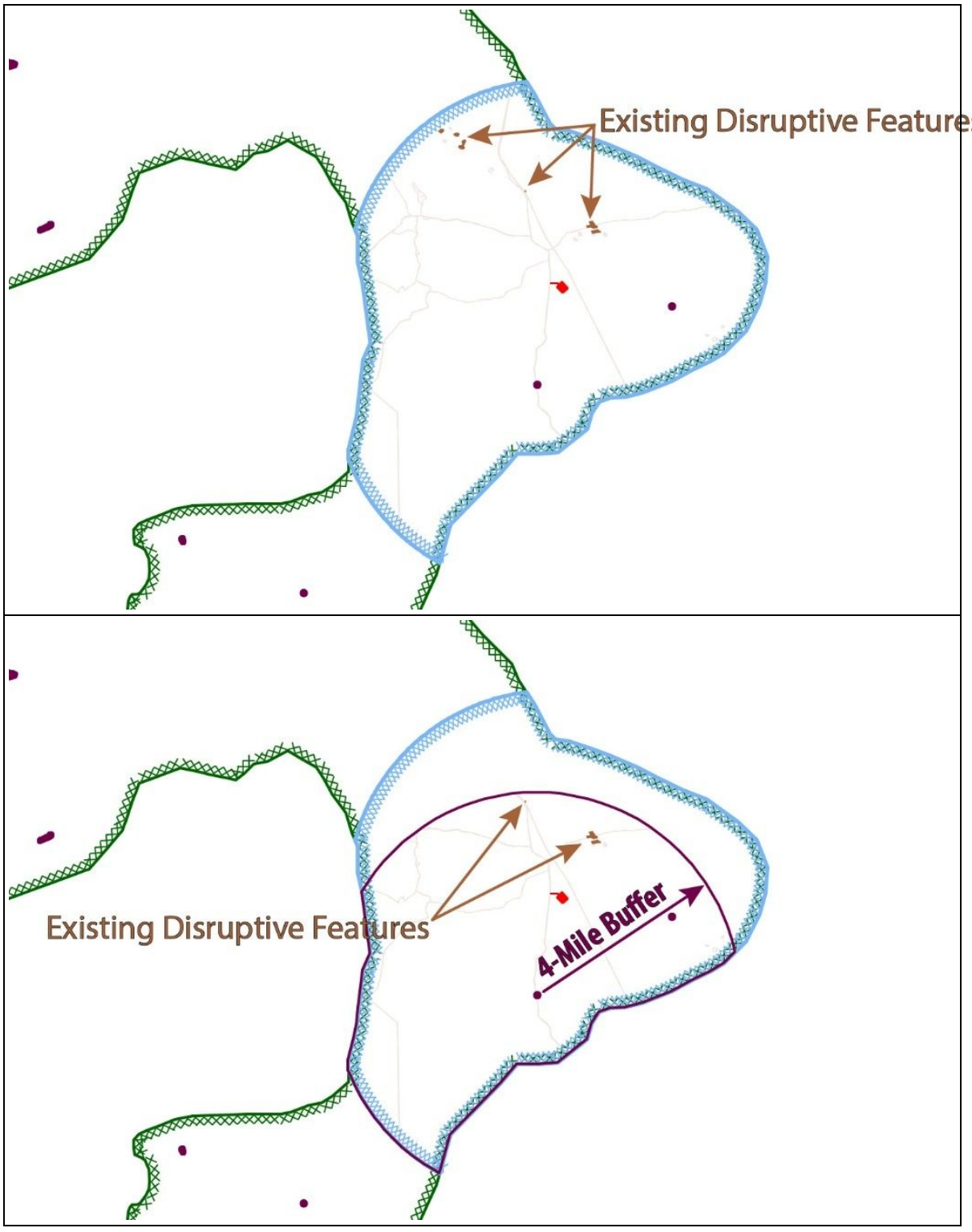


Figure B.4. Existing Disturbance with Four-Mile Buffer

Density of disruptive features will be analyzed for the DDCT assessment area as a whole and for each individual lek within the DDCT assessment area (see Figure B.5, "Density of Existing Disruptive Features in the DDCT Assessment Area" (p. 1790)).


Existing Disruptive Features
Existing Disruptive Features
4-Mile Buffer

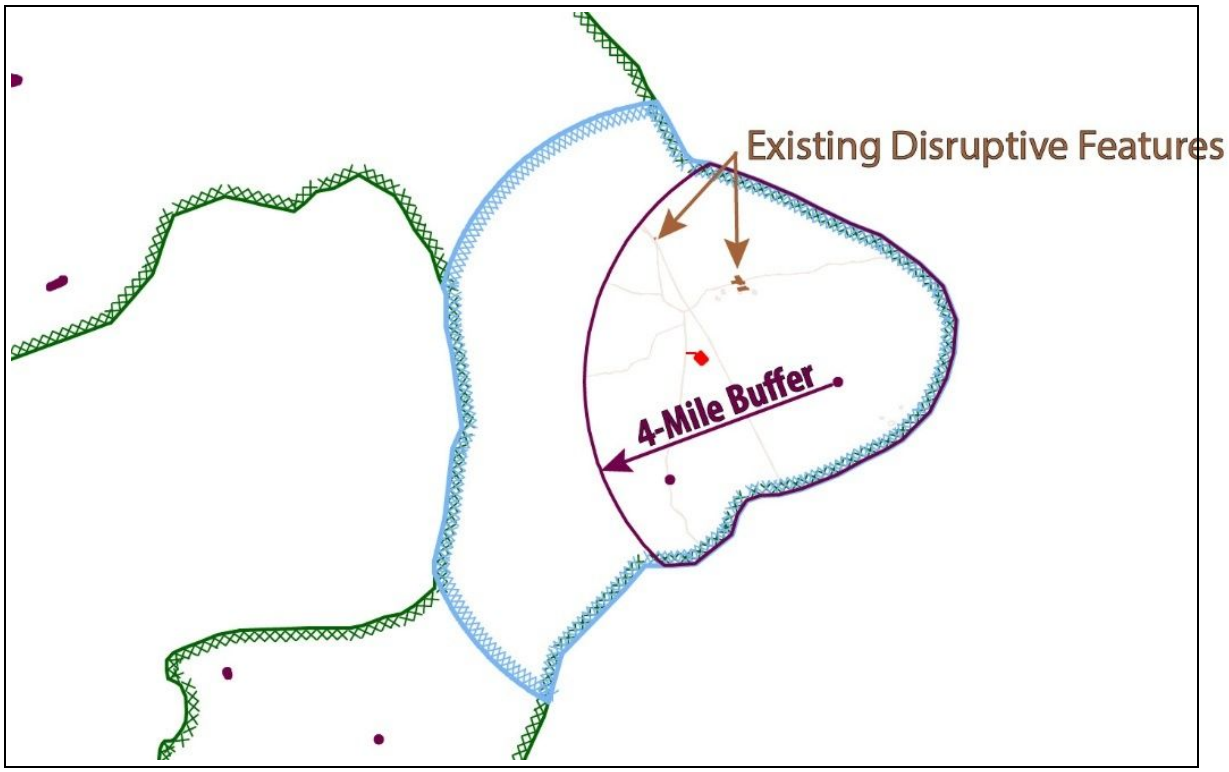


Figure B.5. Density of Existing Disruptive Features in the DDCT Assessment Area

If there are no leks identified for this assessment within the four-mile boundary around the project boundary, the DDCT assessment area will be that portion of the four-mile project boundary within the core population area.

2. Density and Disturbance Analysis: The total number of discrete disruptive activity features, as well as the total disturbance acres within the DDCT assessment area will be determined through an evaluation of:
   a. Existing disturbance (sage-grouse habitat that is disturbed due to existing anthropogenic activity and wildfire).
   b. Approved permits (that have approval for on the ground activity) not yet implemented.
   c. Validating digitized disturbance through on the ground evaluation.

Permitting

The complete analysis package (DDCT results, mapbook, and Worksheet), and recommendations developed by consultation and review outlined herein will be forwarded to the appropriate permitting agency(s). WGFD recommendations will be included, as will other recommendations from project proponents and other appropriate agencies. Project proponent shall have access to all information used in developing recommendations. Where possible and when requested by the project proponent, State agencies shall provide the project proponent with potential development alternatives other than those contained in the project proposal.

If the permit for which a proponent has applied expires, another DDCT analysis is required before issuing a new permit. An additional DDCT is not required for Permit extensions or

renewals when no changes are being authorized. Any project will need to comply with the current Executive Order.

Step 2.3

The BLM/USFS's goal for any new activity or development proposal within core areas is to provide consistent implementation of project proposals which meet the BLM's LUP goals and the population management objectives of the State. Activities would be consistent with the strategy where it can be sufficiently demonstrated that no declines to core populations would be expected as a result of the proposed action. Published research suggests that impacts to sage-grouse leks associated primarily with infrastructure and energy development are discernible at a distance of at least 4 miles and that many leks within this radius have been extirpated as a direct result of development (Walker et al. 2007; Walker 2008). Research also suggests that an evaluation of habitats and sage-grouse populations that attend leks within an 11-mile radius from the project boundary in the context of "large" projects may be appropriate in order to consider all seasonal habitats that may be affected for birds that use the habitats associated with the proposal during some portion of the life-cycle of seasonally migratory sage-grouse (Connelly et al. 2000).

To determine the manner in which Greater Sage-Grouse may be impacted by proposed undertakings, the following will be reviewed in the site specific NEPA analysis to quantify the effects:

- Greater Sage-Grouse Habitat delineation maps.
- Current science recommendations.
- The 'Base Line Environment Report' (USGS) which identifies areas of direct and indirect effect for various anthropogenic activities.
- Consultation with agency or State Wildlife Agency biologist.
- Other methods needed to provide an accurate assessment of impacts.

If the proposal will not have a direct or indirect impact on either the habitat or population, document the findings in the NEPA and proceed with the appropriate process for review, decision and implementation of the project.

B.1.3. Step 3 – Apply Avoidance and Minimization Measures to Comply with Sage-Grouse Goals and Objectives

If the project can be relocated so as to not have an impact on sage-grouse and still achieve objectives of the proposal and the disturbance limitations, relocate the proposed activity and proceed with the appropriate process for review, decision and implementation (NEPA and DR). This Step does not consider redesign of the project to reduce or eliminate direct and indirect impacts, but rather authorization of the project in a physical location that will not impact Greater Sage-Grouse. If the preliminary review of the proposal concludes that there may be adverse impacts to sage-grouse habitat or populations in Step 2 and the project cannot be effectively relocated to avoid these impacts, proceed with the appropriate process for review, decision and implementation (NEPA and Decision Record) with the inclusion of appropriate mitigation requirements to further reduce or eliminate impacts to sage-grouse habitat and populations and achieve compliance with sage-grouse objectives. Mitigation measures could include design modifications of the proposal, site disturbance restoration, post project reclamation, etc (see Appendix D (p. 1863)). Compensatory or offsite mitigation may be required (Step 4) in situations where residual impacts remain after application of all avoidance and minimization measures.

B.1.4. Step 4 – Apply Compensatory Mitigation or Reject / Defer Proposal

If screening of the proposal has determined that direct and indirect impacts cannot be eliminated through avoidance or minimization, evaluate the proposal to determine if compensatory mitigation can be used to offset the remaining adverse impacts and achieve sage-grouse goals and objectives. If the impacts cannot be effectively mitigated, reject or defer the proposal. The criteria for determining this situation could include but are not limited to:

- The current trend within the Priority Habitat is down and additional impacts, whether mitigated or not, could lead to further decline of the species or habitat.
- The proposed mitigation is inadequate in scope or duration, has proven to be ineffective or is unproven is terms of science based approach.
- The project would impact habitat that has been determined to be a limiting factor for species sustainability.
- Other site specific information and analysis that determined the project would lead to a downward change of the current species population or habitat and not comply with sage-grouse goals and objectives.

If, following application of available impact avoidance and minimization measures, the project can be mitigated to fully offset impacts and assure conservation gain to the species and comply with sage-grouse goals and objectives, proceed with the appropriate process for review, decision and implementation (NEPA and Decision Record).

Mitigation

General

In undertaking BLM/USFS management actions, and, consistent with valid existing rights and applicable law, in authorizing third party actions that result in habitat loss and degradation within PHMA, the BLM/USFS will require and assure mitigation that provides a net conservation gain to the species including accounting for any uncertainty associated with the effectiveness of such mitigation. This will be achieved by avoiding, minimizing, and compensating for impacts by applying beneficial mitigation actions. Mitigation will follow the regulations from the White House CEQ (40 CFR 1508.20; e.g., avoid, minimize, and compensate), hereafter referred to as the mitigation hierarchy. If impacts from BLM/USFS management actions and authorized third party actions that result in habitat loss and degradation remain after applying avoidance and minimization measures (i.e., residual impacts), then compensatory mitigation projects will be used to provide a net conservation gain to the species. Any compensatory mitigation will be durable, timely, and in addition to that which would have resulted without the compensatory mitigation (see Glossary Terms (p. 1841)).

The BLM/USFS, via the WAFWA Management Zone Greater Sage-Grouse Conservation Team, will develop a WAFWA Management Zone Regional Mitigation Strategy that will inform the NEPA decision making process including the application of the mitigation hierarchy for BLM/USFS management actions and third party actions that result in habitat loss and degradation. A robust and transparent Regional Mitigation Strategy will contribute to Greater Sage-Grouse habitat conservation by reducing, eliminating, or minimizing threats and compensating for residual impacts to Greater Sage-Grouse and its habitat.

The BLM's Regional Mitigation Manual MS-1794 serves as a framework for developing and implementing a Regional Mitigation Strategy. The following sections provide additional guidance specific to the development and implementation of a WAFWA Management Zone Regional Mitigation Strategy.

Developing a WAFWA Management Zone Regional Mitigation Strategy

The BLM/USFS, via the WAFWA Management Zone Greater Sage-Grouse Conservation Team, will develop a WAFWA Management Zone Regional Mitigation Strategy to guide the application of the mitigation hierarchy for BLM/USFS management actions and third party actions that result in habitat loss and degradation. The Strategy should consider any State-level Greater Sage-Grouse mitigation guidance that is consistent with the requirements identified in this Appendix. The Regional Mitigation Strategy should be developed in a transparent manner, based on the best science available and standardized metrics.

As described in Chapter 2, the BLM/USFS will establish a WAFWA Management Zone Greater Sage-Grouse Conservation Team (hereafter, Team) to help guide the conservation of Greater Sage-Grouse, within 90 days of the issuance of the Record of Decision. The Strategy will be developed within one year of the issuance of the Record of Decision.

The Regional Mitigation Strategy should include mitigation guidance on avoidance, minimization, and compensation, as follows:

- Avoidance
  - Include avoidance areas (e.g., right-of-way avoidance/exclusion areas, no surface occupancy areas) already included in laws, regulations, policies, and/or land use plans (e.g., Resource Management Plans, Forest Plans, State Plans); and,
  - Include any potential, additional avoidance actions (e.g., additional avoidance best management practices) with regard to Greater Sage-Grouse conservation.
- Minimization
  - Include minimization actions (e.g., required design features, best management practices) already included in laws, regulations, policies, land use plans, and/or land-use authorizations; and,
  - Include any potential, additional minimization actions (e.g., additional minimization best management practices) with regard to Greater Sage-Grouse conservation.
- Compensation
  - Include discussion of impact/project valuation, compensatory mitigation options, siting, compensatory project types and costs, monitoring, reporting, and program administration. Each of these topics is discussed in more detail below.
    - Residual Impact and Compensatory Mitigation Project Valuation Guidance
      - A common standardized method should be identified for estimating the value of the residual impacts and value of the compensatory mitigation projects, including accounting for any uncertainty associated with the effectiveness of the projects.
      - This method should consider the quality of habitat, scarcity of the habitat, and the size of the impact/project.
      - For compensatory mitigation projects, consideration of durability (see Glossary Terms (p. 1841)), timeliness (see Glossary Terms (p. 1841)), and the potential for failure (e.g., uncertainty associated with effectiveness) may require an upward adjustment of the valuation.

- The resultant compensatory mitigation project will, after application of the above guidance, result in proactive conservation measures for Greater Sage-Grouse (consistent with BLM Manual 6840 – Special Status Species Management, section .02).

- Compensatory Mitigation Options
  - Options for implementing compensatory mitigation should be identified, such as:
    - Utilizing certified mitigation/conservation bank or credit exchanges.
    - Contributing to an existing mitigation/conservation fund.
    - Authorized-user conducted mitigation projects.
  - For any compensatory mitigation project, the investment must be additional (i.e., additionality: the conservation benefits of compensatory mitigation are demonstrably new and would not have resulted without the compensatory mitigation project).
- Compensatory Mitigation Siting
  - Sites should be in areas that have the potential to yield a net conservation gain to the Greater Sage-Grouse, regardless of land ownership.
  - Sites should be durable (see Glossary Terms (p. 1841)).
  - Sites identified by existing plans and strategies (e.g., fire restoration plans, invasive species strategies, healthy land focal areas) should be considered, if those sites have the potential to yield a net conservation gain to Greater Sage-Grouse and are durable.
- Compensatory Mitigation Project Types and Costs
  - Project types should be identified that help reduce threats to Greater Sage-Grouse (e.g., protection, conservation, and restoration projects).
  - Each project type should have a goal and measurable objectives.
  - Each project type should have associated monitoring and maintenance requirements, for the duration of the impact.
  - To inform contributions to a mitigation/conservation fund, expected costs for these project types (and their monitoring and maintenance), within the WAFWA Management Zone, should be identified.
- Compensatory Mitigation Compliance and Monitoring
  - Mitigation projects should be inspected to ensure they are implemented as designed, and if not, there should be methods to enforce compliance.
  - Mitigation projects should be monitored to ensure that the goals and objectives are met and that the benefits are effective for the duration of the impact.
- Compensatory Mitigation Reporting
  - Standardized, transparent, scalable, and scientifically-defensible reporting requirements should be identified for mitigation projects.
  - Reports should be compiled, summarized, and reviewed in the WAFWA Management Zone in order to determine if Greater Sage-Grouse conservation has been achieved and/or to support adaptive management recommendations.
- Compensatory Mitigation Program Implementation Guidelines
  - Guidelines for implementing the State-level compensatory mitigation program should include holding and applying compensatory mitigation funds, operating a transparent and credible accounting system, certifying mitigation credits, and managing reporting requirements.

Incorporating the Regional Mitigation Strategy into NEPA Analyses

The BLM/USFS will include the avoidance, minimization, and compensatory recommendations from the Regional Mitigation Strategy in one or more of the NEPA analysis' alternatives for BLM/USFS management actions and third party actions that result in habitat loss and degradation and the appropriate mitigation actions will be carried forward into the decision.

Implementing a Compensatory Mitigation Program

The BLM/USFS need to ensure that compensatory mitigation is strategically implemented to provide a net conservation gain to the species, as identified in the Regional Mitigation Strategy. In order to align with existing compensatory mitigation efforts, this compensatory mitigation program will be managed at a State-level (as opposed to a WAFWA Management Zone, a Field Office, or a Forest), in collaboration with our partners (e.g., Federal, Tribal, and State agencies).

To ensure transparent and effective management of the compensatory mitigation funds, the BLM/USFS will enter into a contract or agreement with a third-party to help manage the State-level compensatory mitigation funds, within one year of the issuance of the Record of Decision. The selection of the third-party compensatory mitigation administrator will conform to all relevant laws, regulations, and policies. The BLM/USFS will remain responsible for making decisions that affect Federal lands.

B.2. COT Objective 2: Implement Targeted Habitat Management and Restoration

> Some sage-grouse populations warrant more than the amelioration of the impacts from stressors to maintain sage-grouse on the landscape. In these instances, and particularly with impacts resulting from wildfire, it may be critical to not only remove or reduce anthropogenic threats to these populations but additionally to improve population health through active habitat management (e.g., habitat restoration). This is particularly important for those populations that are essential to maintaining range-wide redundancy and representation. (COT Report, 2013)

In many areas of Wyoming, amelioration of threats isn't enough. Activities must be taken to enhance the habitat for continued success of Greater Sage-Grouse. This objective identifies the areas where RMPs will put forth the commitments for habitat restoration and enhancement.

The Wyoming Game and Fish Department established local Greater Sage-Grouse working groups over 10 years ago. Each of these local working groups developed conservation plans which have served to guide conservation of Greater Sage-Grouse habitat at a local level. The management objectives for this federal land use plan were developed in coordination with the State of Wyoming, recognizing the ongoing work which has been done over the last 10 years in Wyoming as a result of the conservation efforts identified by each of the local working groups.

Upon completion of the planning process, with issuance of an Approved Plan and Record of Decision, subsequent implementation decisions will be put into effect by developing implementation (activity-level or project-specific) plans. These implementation decisions will be based upon the objectives identified in the Approved Plan and Record of Decisions, and will be coordinated with local working groups.

B.3. COT Objective 3: Develop and Implement State and Federal Conservation Strategies and Associated Incentive-based Conservation Actions and Regulatory Mechanisms

> To conserve sage-grouse and habitat redundancy, representation, and resilience, state and federal agencies, along with interested stakeholders within range of the

> sage-grouse should work together to develop a plan, including any necessary regulatory or legal tools (or use an existing plan, if appropriate) that includes clear mechanisms for addressing the threats to sage-grouse within PACs. Where consistent with state conservation plans, sage-grouse habitats outside of PACs should also be addressed. We recognize that threats can be ameliorated through a variety of tools within the purview of states and federal agencies, including incentive-based conservation actions or regulatory mechanisms. Federal land management agencies should work with states in developing adequate regulatory mechanisms. Federal land management agencies should also contribute to the incentive-based conservation and habitat restoration and rehabilitation efforts. In the development of conservation plans, entities (states, federal land management agencies, etc.) should coordinate with FWS. This will ensure that the plans address the threats contributing to the 2010 warranted but precluded determination, and that conservation strategies will meaningfully contribute to future listing analyses. (COT Report, 2013)

B.3.1. Implementation Working Groups

Implementation strategies for a landscape scale species requires coordination across multiple scales, as the work that is conducted at the local scale must be tracked and evaluated for overall success within core areas, the state of Wyoming across the region. As the Greater Sage-Grouse is formally managed by the State of Wyoming, and has a statewide strategy through Governor's Executive Order 2011-05, implementation must be evaluated at that scale as well. For this reason, Wyoming Plans will utilize multiple types of working groups, representing each of the scales at which implementation will be tracked.

National Level

In December 2011, Wyoming Governor Matt Mead and Secretary of the Interior Ken Salazar co-hosted a meeting to address coordinated conservation of the sage-grouse across its range. Ten states within the range of the sage-grouse were represented, as were the USFS, the Natural Resources Conservation Service (NRCS), and the Department of the Interior (DOI) — including representatives from the DOI's BLM and USFWS. The primary outcome of the meeting was the creation of a Sage-Grouse Task Force (Task Force) chaired by Governors Mead (WY) and Hickenlooper (CO) and the Director of the BLM. The Task Force was directed to develop recommendations on how to best advance a coordinated, multi-state, range-wide effort to conserve the sage-grouse, including the identification of conservation objectives to ensure the long-term viability of the species.

Regional Level

Regional Level Teams (Sage Grouse Implementation Group)

State Level

The Sage Grouse Implementation Team (SGIT) has been established through Wyoming Legislature (Wyoming Statute 9-19-101(a)) to review data and make recommendations to the Governor of Wyoming regarding actions and funding to enhance and restore Greater Sage-Grouse habitats in Wyoming. Additionally, the SGIT is responsible for making recommendations to the Governor regarding regulatory actions necessary to maintain Greater Sage-Grouse populations and Greater Sage-Grouse habitats.

Adaptive Management Working Group has been established in consultation with the SGIT to provide appropriate guidance for agencies with the ability to affect sage-grouse populations and/or habitat through their permitting authority. The AMWG includes BLM, USFS, USFWS, and State of Wyoming.

Local Level

In 2000, a Local Working Group was established by the Wyoming Game and Fish Department to develop and facilitate implementation of local conservation plans for the benefit of sage-grouse, their habitats, and whenever feasible, other species that use sagebrush habitats. This group prepared the Wyoming Greater Sage-Grouse Conservation Plan (Wyoming Sage-Grouse Working Group 2003) to provide coordinated management and direction across the state. In 2004, local Greater Sage-Grouse working groups were formed to develop and implement local conservation plans. Eight local working groups around Wyoming have completed conservation plans, many of which prioritize addressing past, present, and reasonably foreseeable threats at the state and local levels, and prescribe management actions for private landowners to improve Greater Sage-Grouse conservation at the local scale, consistent with Wyoming's Core Population Area Strategy.

B.3.2. Implementation Tracking

Because the State of Wyoming continues to retain management of the species, and through implementation of the Executive Order, BLM Wyoming will continue to coordinate tracking of populations, disturbance and conservation actions.

- DDCT GIS for tracking disturbance
- De-minimus Actions
- Population Counts
- Lek counts
- Conservation Actions

In addition to the tracking databases being maintained by the State of Wyoming, a national-Greater Sage-Grouse Land Use Plan Decision Monitoring and Reporting Tool is being developed to describe how the BLM and the USFS will consistently and systematically monitor and report implementation-level activity plans and implementation actions for all plans within the range of sage-grouse. A description of this tool for collection and reporting of tabular and spatially explicit data will be included in the Record of Decision or approved plan. The BLM and the USFS will provide data that can be integrated with other conservation efforts conducted by state and federal partners.

B.3.3. Public Involvement

A website where the public can quickly and easily access data concerning implementation will be developed and kept current on the Wyoming BLM database. Creating this website and maintaining it through the implementation cycle will be a vital part of implementation success. The public is welcome to provide implementation comments to the BLM any time during the cycle, but schedules for implementation planning decisions will be posted so the public can make timely comments. All Activity Plan Working Group meetings where recommendations are made to the BLM will be open to the public, and will provide for specific and helpful public involvement. This includes providing web-based information to the public prior to any Activity

Plan Working Group meetings; such that members of the public can provide input to the working session, both early and mid-way through the scheduled meetings.

The state sponsored Local Working Group (LWG) and Sage Grouse Implementation Team (SGIT) meetings are advertised and open to the public.

B.4. COT Objective 4: Proactive Conservation Actions

> Proactive, incentive based, voluntary conservation actions (e.g., Candidate Conservation Agreements with Assurances, Natural Resources Conservation Service programs) should be developed and/or implemented by interested stakeholders and closely coordinated across the range of the species to ensure they are complimentary and address sage-grouse conservation needs and threats. These efforts need to receive full funding, including funding for necessary personnel. (COT Report, 2013)

In addition to the conservation activities identified through implementation of the Resource Management Plan in coordination with the Local Working Group Conservation Plans, BLM and USFS will continue to partner with other agencies and stakeholders to identify conservation actions to benefit Greater Sage-Grouse habitat. Actions which may occur could include Candidate Conservation Agreements (CCAs) with accompanying Candidate Conservation Agreements with Assurances (CCAAs) and designation of conservation easements.

CCAs are entered into when a potential threat to habitat is identified. BLM enters into CCAs with USFWS to identify potential threats and plan for conservation measures to address potential threats. The purpose of CCAs and the accompanying CCAAs for private lands is to prevent listing of any sensitive species under ESA.

BLM Wyoming has already entered into a Statewide CCA for range management on BLM lands in Wyoming. This CCA promotes proper livestock grazing and management through implementation of voluntary conservation measures and management practices that are consistent with Greater Sage-Grouse population management and habitat conservation objectives on BLM lands.

Conservation Easements are identified private lands with Greater Sage-Grouse habitat where the private landowners enter into voluntary agreements with the government to give up developmental rights which may adversely affect habitat. The most common way these areas may be used in Wyoming is for mitigation banks. Allowing development within some areas of historic Greater Sage-Grouse habitat or marginal habitat will require appropriate mitigation. In some cases the most appropriate mitigation may be for project proponents to buy credits at a conservation easement, thus creating a mitigation bank. Overall, the benefit is to the Greater Sage-Grouse, as it reduces the overall potential for fragmented habitat by ensuring there are areas with no development potential which could adversely affect the viability of the species.

Sweetwater River Conservancy Habitat Conservation Bank

The Sweetwater River Conservancy Habitat Conservation Bank is the first conservation bank established for Greater Sage-Grouse. Located in central Wyoming, the bank manages habitat for Greater Sage-Grouse allowing energy development and other activities to proceed on other lands within Wyoming. A conservation bank is a site or suite of sites established under an agreement with the USFWS, intended to protect, and improve habitat for species. Credits may be purchased which result in perpetual conservation easements and conservation projects on the land to offset

impacts occurring elsewhere. The Sweetwater River Conservancy Habitat Conservation Bank launched with 55,000 deeded acres of Greater Sage-Grouse habitat, and could expand up to 700,000 acres on other lands owned by the Sweetwater River Conservancy contingent upon demand (USFWS 2015).

Wyoming Landscape Conservation Initiative

The Wyoming Landscape Conservation Initiative is a long-term science based effort to assess and enhance aquatic and terrestrial habitats at a landscape scale in southwest Wyoming, while facilitating responsible development through local collaboration and partnership. Collaborative efforts address multiple concerns at a scale that considers all activities on the landscape, and can leverage resources that might not be available for single agency projects. Greater Sage-Grouse initiatives from the Wyoming Landscape Conservation Initiative have included habitat enhancement efforts (e.g., invasive weed treatment, prescribed grazing strategies), and Greater Sage-Grouse research studies (Wyoming Landscape Conservation Initiative 2013).

Powder River Basin Restoration Program

The Powder River Basin Restoration Program is a collaborative partnership to restore and enhance Greater Sage-Grouse habitat on a landscape level in the Powder River Basin. The basin encompasses 13,493,840 acres in northeast Wyoming and southeast Montana. Surface ownership is composed of approximately 70 percent private lands, 14 percent BLM-administered lands (including 8 percent in Wyoming and 6 percent in Montana), 8 percent Forest Service lands, and 8 percent States of Wyoming and Montana lands. Subsurface mineral ownership is 50 to 60 percent federal (BLM 2014).

The Powder River Basin Restoration Program is focusing on areas affected by the federal oil and gas development that has occurred over the past decade in the Powder River Basin in northeastern Wyoming. Its objectives are restoring or enhancing disturbed previously suitable habitat to suitable habitat for sagebrush obligate species, primarily Greater Sage-Grouse. This includes multiple sites affected by coal bed natural gas abandonment reclamation efforts, wildfires, and noxious and invasive plants. Priority will be given to those areas recognized as priority habitats (e.g., Core Population Areas and connectivity corridors).

Habitat objectives are meeting the needs for nesting, brood-rearing, and late brood-rearing. The program would contribute to efforts focused on the management and control of mosquitoes carrying West Nile virus and would include funding, labor, treatment locations, and other needs as determined.

Additionally, efforts would be coordinated to reduce fuels in and near Greater Sage-Grouse habitat, to enhance sagebrush stands, support restoration efforts, and reduce the risk of high-severity wildfire. Pine stands and juniper woodlands would be managed for structural diversity and to reduce fuels, especially near PHMA, human developments, and recreation areas.

Natural Resource Conservation Service Sage Grouse Initiative

The US Department of Agriculture, Natural Resources Conservation Service's Sage-Grouse Initiative (SGI) is working with private landowners in 11 western states to improve habitat for Greater Sage-Grouse (Manier et al. 2013). With 13.5 million acres of Greater Sage-Grouse habitat in private ownership within MZ II/VII (Manier et al. 2013, p. 118), a unique opportunity

exists for the Natural Resources Conservation Service to benefit Greater Sage-Grouse and to ensure the persistence of large and intact rangelands by implementing the SGI.

Participation in the SGI program is voluntary, but willing participants enter into binding contracts or easements to ensure that conservation practices that enhance Greater Sage-Grouse habitat, such as fence marking, protecting riparian areas, and maintaining vegetation in nesting areas, are implemented. Participating landowners are bound by a contract (usually 3 to 5 years) to implement, in consultation with Natural Resources Conservation Service staff, conservation practices if they wish to receive the financial incentives offered by the SGI. These financial incentives generally take the form of payments to offset costs of implementing conservation practices and easements or rental payments for long-term conservation.

While potentially effective at conserving Greater Sage-Grouse populations and habitat on private lands, incentive-based conservation programs that fund the SGI generally require reauthorization from Congress under subsequent farm bills, meaning future funding is not guaranteed.

B.5. COT Objective 5: Development of Monitoring Plans

> A robust range-wide monitoring program must be developed and implemented for sage-grouse conservation plans, which recognizes and incorporates individual state approaches. A monitoring program is necessary to track the success of conservation plans and proactive conservation activities. Without this information, the actual benefit of conservation activities cannot be measured and there is no capacity to adapt if current management actions are determined to be ineffective. (COT Report, 2013)

B.5.1. The Greater Sage-Grouse (GRSG) Monitoring Framework

B.5.1.1. Introduction

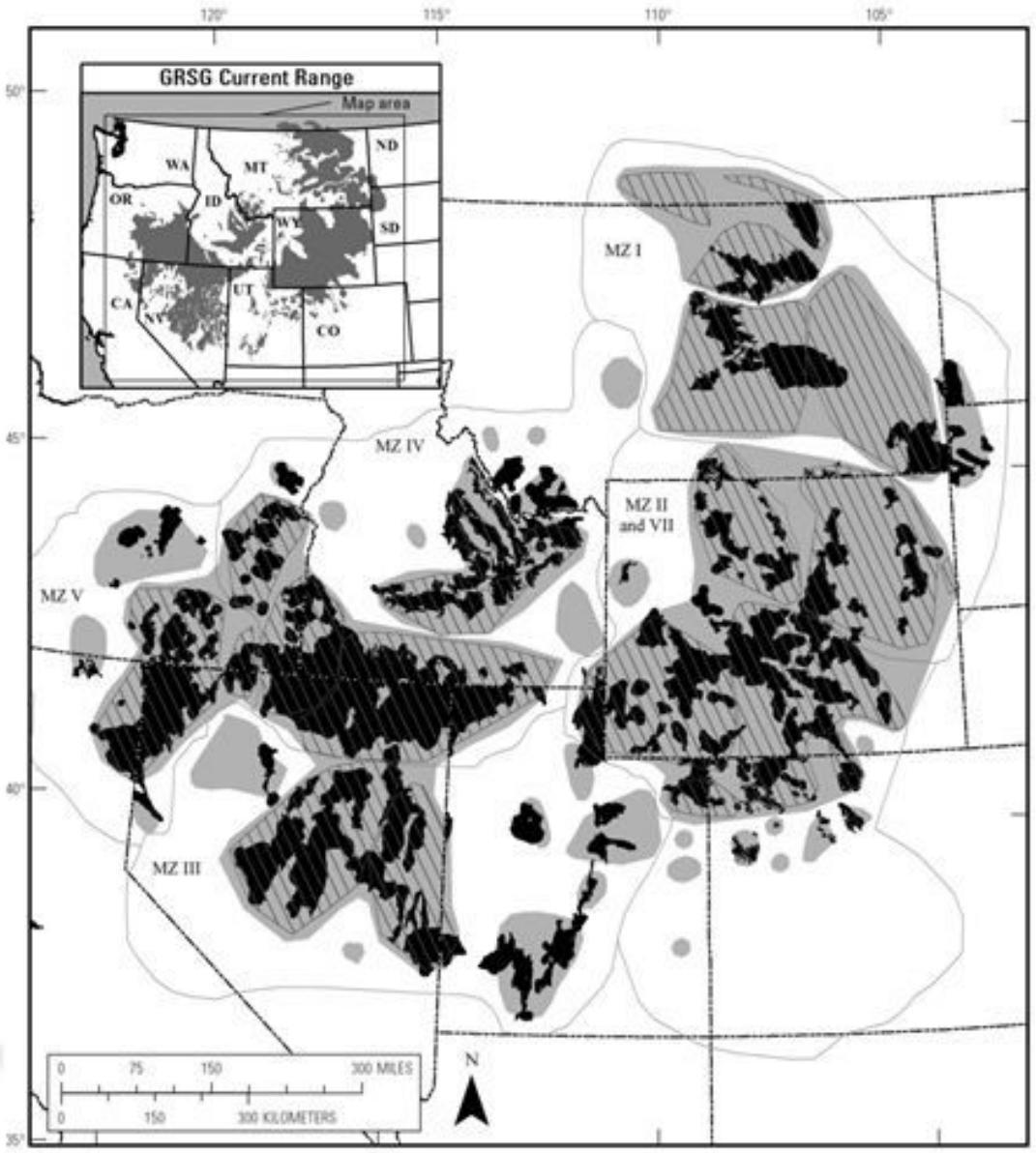
The purpose of this BLM and USFS Greater Sage-grouse Monitoring Framework (hereafter, monitoring framework) is to describe the methods to monitor habitats and evaluate the implementation and effectiveness of the BLM planning strategy (BLM IM 2012-044) and the USFS Land Use Plans to conserve the species and its habitat. The regulations for the BLM (43 CFR 1610.4-9) and the USFS (36 CFR part 209, published July 1, 2010) require that land use plans establish intervals and standards, as appropriate, for monitoring and evaluations, based on the sensitivity of the resource to the decisions involved. Therefore, BLM and USFS will use the methods described herein to collect monitoring data to evaluate implementation and effectiveness of the Greater Sage-Grouse (hereafter, sage-grouse) planning strategy and the conservation measures contained in land use plans. The type of monitoring data to be collected at the land use plan scale will be described in the monitoring plan which will be developed after the signing of the ROD. For a summary of the frequency of reporting see Attachment A. Adaptive management will be informed by data collected at any and all scales.

To ensure the BLM and USFS have the ability to make consistent assessments about sage-grouse habitats across the range of the species, this framework lays out the methodology for monitoring the implementation and evaluating the effectiveness of BLM/USFS actions to conserve the species and its habitat through monitoring that informs effectiveness at multiple scales. Monitoring efforts will include data for measurable quantitative indicators of sagebrush availability, anthropogenic

disturbance levels, and sagebrush conditions. Implementation monitoring results will provide information to allow the BLM and USFS to evaluate the extent that decisions from the BLM resource management plans (RMP) and USFS land management plans (LMP) to conserve sage-grouse and its habitat have been implemented. Population monitoring information will be collected by state fish and wildlife agencies and will be incorporated into effectiveness monitoring as it is made available.

This multi-scale monitoring approach is necessary as sage-grouse are a landscape species and conservation is scale-dependent whereby conservation actions are implemented within seasonal habitats to benefit populations. The four orders of habitat selection (Johnson 1980) used in this monitoring framework are described by Connelly et al. (2003) and Stiver et al. (2014) as first order (broad scale), second order (mid-scale), third order (fine scale), and fourth order (site scale) to apply them to sage-grouse habitat selection. The various scales may show differences because of the methods used. The broad and mid-scale may provide a generalize direction, however the suitability baseline (pre-euro) is not considered an accurate baseline. The current baseline will provide better information on trends provided the data used in the analysis is sound. Based upon the management actions related to the BLM and Wyoming SGEO, the broad and mid-scale may greatly underestimate the impacts of the threats outlined in the COT report. Habitat selection and habitat use by sage-grouse occurs at multiple scales and is driven by multiple environmental and behavioral factors. Managing and monitoring sage-grouse habitats are complicated by the differences in habitat selection across the range and habitat utilization by individual birds within a given season. Therefore, the tendency to look at a single indicator of habitat suitability or only one scale limits the ability for managers to identify the threats to sage-grouse and to respond at the appropriate scale. For descriptions of these habitat suitability indicators for each scale, see the Sage-grouse Habitat Assessment Framework (HAF) (Stiver et al. *in press*).

Monitoring methods and indicators in this monitoring framework are derived from the current peer-reviewed science. Range wide best-available datasets for broad and mid-scale monitoring will be acquired. If these exiting datasets are not readily available or are inadequate, but are necessary to effectively inform the three measurable quantitative indicators (sagebrush availability, anthropogenic disturbance levels, and sagebrush conditions), the BLM will strive to develop datasets or obtain information to fill these data gaps. Datasets that are not readily available to inform the fine and site scale indicators will be developed. These data will be used to generate monitoring reports at the appropriate and applicable geographic scales, boundaries and analysis units: across the range of sage-grouse as defined by Schroeder et al. (2004), and clipped by WAFWA Management Zone (MZ) (Stiver et al. 2006) boundaries and other areas as appropriate for size (e.g., populations based on Connelly et al. 2004; Figure B.6, "Map of Greater Sage-Grouse Range, Populations, Subpopulations, and Priority Areas for Conservation as of 2013" (p. 1802)). This broad and mid-scale monitoring data and analysis will provide context for RMP/LMP areas; states; Greater Sage-Grouse Priority Habitat, General Habitat and other sage-grouse designated management areas; and Priority Areas for Conservation (PACs) as defined in the Greater Sage-grouse Conservation Objectives: Final Report (COT, U.S. Fish and Wildlife Service 2013). Throughout the remainder of the document, all of these areas will be referred to as "sage-grouse areas."



Source: Schroeder et al. 2004, Connelly et al. 2004, USFWS 2013b

COT Conservation Objectives Team
PAC Priority Area for Conservation

Figure B.6. Map of Greater Sage-Grouse Range, Populations, Subpopulations, and Priority Areas for Conservation as of 2013

This monitoring framework is divided into two sections. The broad- and mid-scale methods, described in Section B.5.1.2, "Broad and Mid-Scales" (p. 1804), provide a consistent approach across the range of the species to monitor implementation decisions and actions, mid-scale habitat attributes (e.g., sagebrush availability and habitat degradation), and population changes to determine the effectiveness of the planning strategy and management decisions. (See Table B.3, "Indicators for Monitoring Implementation of the Strategy, Decisions, Sage-Grouse Habitat, and Sage-Grouse Population at the Broad and Mid-scales" (p. 1804)) For sage-grouse habitat at the fine and site scales, described in Section B.5.1.3, "Fine and Site Scales" (p. 1828), this monitoring framework describes a consistent approach (e.g., indicators and methods) for monitoring sage-grouse seasonal habitats. Funding, support, and dedicated personnel for broad- and mid-scale monitoring will be renewed annually through the normal budget process. For an overview of BLM and USFS multiscale monitoring commitments (see Attachment A).

Table B.3. Indicators for Monitoring Implementation of the Strategy, Decisions, Sage-Grouse Habitat, and Sage-Grouse Population at the Broad and Mid-scales

Implementation		Habitat		Population (State Wildlife Agencies)
Geographic Scales		**Availability**	**Degradation**	**Demographics**
Broad Scale: From the range of sage-grouse to WAFWA Management Zones	BLM/USFS Planning Strategy goal and objectives	Distribution and amount of sagebrush within the range	Distribution and amount of energy, mining and infrastructure facilities	WAFWA Management Zone population trend
Mid-scale: From WAFWA Management Zone to populations	An analysis of RMP/LRMP decisions across the designated scale	Mid-scale habitat indicators (HAF 2014; Table 2 e.g., percent of sagebrush per unit area)	Distribution and amount of energy, mining and infrastructure facilities (Table 2)	Individual population trend
Fine Scale: PACs	A summary of DDCT actions related to BLM mineral and surface resources in conjunction with other ownerships	Areas that have greater than 5% sagebrush cover and non-habitat (unsuitable) that is less than 0.6 miles from the suitable habitat	Distribution and amount of anthropogenic disturbances and wildfire occurrences impacting specific PACs	PAC trends
Site Scale: DDCT Level	A summary of DDCT actions related to BLM mineral and surface resources	The available occupied habitat using the DDCT process	Distribution and amount of anthropogenic disturbances and wildfire occurrences impacting specific PACs	Individual lek trends

BLM Bureau of Land Management
DDCT Density and Disturbance Calculation Tool
PAC Priority Area for Conservation
USFS U.S. Forest Service
WAFWA Western Association of Fish and Wildlife Agencies

B.5.1.2. Broad and Mid-Scales

First-order habitat selection, the broad scale, describes the physical or geographical range of a species. The first-order habitat of the sage-grouse is defined by populations of sage-grouse

associated with sagebrush landscapes, based on Schroeder et al. 2004, and Connelly et al. 2004, and on population or habitat surveys since 2004. An intermediate scale between the broad and mid scales was delineated by WAFWA from floristic provinces within which similar environmental factors influence vegetation communities. This scale is referred to as the WAFWA Sage-Grouse Management Zones (MZs). Although no indicators are specific to this scale, these MZs are biologically meaningful as reporting units.

Second-order habitat selection, the mid-scale, includes sage-grouse populations and PACs. The second order includes at least 40 discrete populations and subpopulations (Connelly et al. 2004). Populations range in area from 150 to 60,000 square miles and are nested within MZs. PACs range from 20 to 20,400 square miles and are nested within population areas.

Other mid-scale landscape indicators, such as patch size and number, patch connectivity, linkage areas, and landscape matrix and edge effects (Stiver et al. *in press*) will also be assessed. The methods used to calculate these metrics will be derived from existing literature (Knick et al. 2011; Leu and Hanser 2011; Knick and Hanser 2011).

Midscale indicators using the HAF can grossly underestimate the occupation of anthropogenic activities because of the use of 30m pixels (page Table II – X). The HAF removes 'non' habitat from the suitability availability. There are no parameters that are provided to protect adjacent suitable habitat from development on these nonhabitat parcels, thus making the adjacent nonhabitat a potential threat by indirect impacts.

The Wyoming BLM and USFS Offices will be actively participating in a fine and site scale monitoring that will more accurately reflect the impacts associated with direct and indirect effects of anthropogenic and wildfire impacts.

B.5.1.2.1. Implementation (Decision) Monitoring

Implementation monitoring is the process of tracking and documenting the implementation (or the progress toward implementation) of RMP/LMP decisions. The BLM and the USFS will monitor implementation of project-level and/or site-specific actions and authorizations, with their associated conditions of approval/stipulations for sage-grouse, spatially (as appropriate) within Priority Habitat, General Habitat, and other sage-grouse designated management areas, at a minimum, for the Buffalo planning area. These actions and authorizations, as well as progress toward completing and implementing activity-level plans, will be monitored consistently across all planning units and will be reported to BLM and USFS headquarters annually, as well as reported to the State of Wyoming with numerical and spatial data twice a year, and a HQ summary report every 5 years, for the Buffalo planning area. A national-level Greater Sage-Grouse Land Use Plan Decision Monitoring and Reporting Tool is being developed to describe how the BLM and the USFS will consistently and systematically monitor and report implementation-level activity plans and implementation actions for all plans within the range of sage-grouse. A description of this tool for collection and reporting of tabular and spatially explicit data will be included in the Record of Decision or approved plan. The BLM will provide data that can be integrated with other conservation efforts conducted by state and federal partners.

B.5.1.2.2. Habitat (Vegetation) Monitoring

The USFWS, in its 2010 listing decision for the sage-grouse, identified 18 threats contributing to the destruction, modification, or curtailment of sage-grouse habitat or range (75 FR 13910 2010).

The BLM will, therefore, monitor the relative extent of these threats that remove sagebrush, both spatially and temporally, on all lands within an analysis area, and will report on amount, pattern, and condition at the appropriate and applicable geographic scales and boundaries. These 18 threats have been aggregated into three broad- and mid-scale measures to account for whether the threat predominantly removes sagebrush or degrades habitat (see Table B.4, "Relationship Between the Eighteen Threats and the Three Habitat Disturbance Measures for Monitoring" (p. 1806)). The three measures are:

1. Sagebrush Availability (percent of sagebrush per suitable unit area)
2. Habitat Degradation (percent of human activity per unit area)
3. Energy and Mining Density (facilities and locations per suitable unit area)

These three habitat disturbance measures will evaluate disturbance on all lands within priority habitat, regardless of land ownership. The direct area of influence will be assessed with the goal of accounting for actual removal of sagebrush on which sage-grouse depend (Connelly et al. 2000) and for habitat degradation as a surrogate for human activity. Measure 1 (sagebrush availability) examines where disturbances have removed plant communities that support sagebrush (or have broadly removed sagebrush from the landscape). Measure 1, therefore, monitors the change in sagebrush availability–or, specifically, where and how much of the sagebrush community is available on lands that can support sagebrush within the range of sage-grouse. The sagebrush community is defined as the ecological systems that have the capability of supporting sagebrush vegetation and seasonal sage-grouse habitats within the range of sage-grouse (see Section B.5.1.2.2.1, "Sagebrush Availability (Measure 1)" (p. 1807)). Measure 2 (see Section B.5.1.2.2.2, "Habitat Degradation Monitoring (Measure 2)" (p. 1817)) and Measure 3 (see Section B.5.1.2.2.3, "Energy and Mining Density (Measure 3)" (p. 1822)) focus on where habitat degradation is occurring within suitable sagebrush soils by using the footprint/area of direct disturbance and the number of facilities at the mid scale to identify the relative amount of degradation per geographic area of interest and in areas that have the capability of supporting sagebrush and seasonal sage-grouse use. Measure 2 (habitat degradation) not only quantifies footprint/area of direct disturbance but also establishes a surrogate for those threats most likely to have ongoing activity. Because energy development and mining activities are typically the most intensive activities in sagebrush habitat, Measure 3 (the density of active energy development, production, and mining sites) will help identify areas of particular concern for such factors as noise, dust, traffic, etc. that degrade sage-grouse habitat.

Table B.4. Relationship Between the Eighteen Threats and the Three Habitat Disturbance Measures for Monitoring

USFWS Listing Decision Threat	Sagebrush Availability	Habitat Degradation	Density of Energy and Mining
Agriculture	X		
Urbanization	X		
Wildfire	X		
Conifer encroachment	X		
Treatments	X		
Invasive Species	X		
Energy (oil and gas wells and development facilities)		X	X
Energy (coal mines)		X	X
Energy (wind towers)		X	X
Energy (solar fields)		X	X
Energy (geothermal)		X	X

USFWS Listing Decision Threat	Sagebrush Availability	Habitat Degradation	Density of Energy and Mining
Mining (active locatable, leasable, and salable developments)		X	X
Infrastructure (roads)		X	
Infrastructure (railroads)		X	
Infrastructure (power lines)		X	
Infrastructure (communication towers)		X	
Infrastructure (other vertical structures)		X	
Other developed rights of ways		X	
Note: Data availability may preclude specific analysis of individual layers. See the detailed methodology for more information. USFWS U.S. Fish and Wildlife Service			

The methods to monitor disturbance found herein differ slightly from methods used in the Sage-Grouse Baseline Environmental Report (BER) (Manier et al. 2013) that provided a baseline of datasets of disturbance across jurisdictions. One difference is that, for some threats, the data in the BER were for federal lands only. In addition, threats were assessed individually in that report, using different assumptions from those in this monitoring framework about how to quantify the location and magnitude of threats. The methodology herein builds on the BER methodology and identifies datasets and procedures to utilize the best available data across the range of the sage-grouse and to formulate a consistent approach to quantify impact of the threats through time. This methodology also describes an approach to combine the threats and calculate the three measures.

B.5.1.2.2.1. Sagebrush Availability (Measure 1)

Sage-grouse populations have been found to be more resilient where a percentage of the landscape is maintained in sagebrush (Knick and Connelly 2011), which will be determined by sagebrush availability. Measure 1 has been divided into two submeasures to describe sagebrush availability on the landscape:

- Measure 1a: the current amount of sagebrush on the geographic area of interest, and
- Measure 1b: the amount of sagebrush on the geographic area of interest compared with the amount of sagebrush the landscape of interest could ecologically support.

Measure 1a (the current amount of sagebrush on the landscape) will be calculated using this formula: [the existing updated sagebrush layer] divided by [the geographic area of interest]. The appropriate geographic areas of interest for sagebrush availability include the species' range, WAFWA MZs, populations, and PACs. In some cases these sage-grouse areas will need to be aggregated to provide an estimate of sagebrush availability with an acceptable level of accuracy.

Measure 1b (the amount of sagebrush for context within the geographic area of interest) will be calculated using this formula: [existing sagebrush divided by [pre-EuroAmerican settlement geographic extent of lands that could have supported sagebrush]. This measure will provide information to set the context for a given geographic area of interest during evaluations of monitoring data. The information could also be used to inform management options for restoration or mitigation and to inform effectiveness monitoring.

The sagebrush base layer for Measure 1 will be based on geospatial vegetation data adjusted for the threats listed in Table B.2, "Implementation of RMP Decisions to Address COT Threats" (p. 1782). The following subsections of this monitoring framework describe the methodology for determining both the current availability of sagebrush on the landscape and the context of the amount of sagebrush on the landscape at the broad and mid scales.

a. Establishing the Sagebrush Base Layer: The current geographic extent of sagebrush vegetation within the rangewide distribution of sage-grouse populations will be ascertained using the most recent version of the Existing Vegetation Type (EVT) layer in LANDFIRE (2013). LANDFIRE EVT was selected to serve as the sagebrush base layer for five reasons: 1) it is the only nationally consistent vegetation layer that has been updated multiple times since 2001; 2) the ecological systems classification within LANDFIRE EVT includes multiple sagebrush type classes that, when aggregated, provide a more accurate (compared with individual classes) and seamless sagebrush base layer across jurisdictional boundaries; 3) LANDFIRE performed a rigorous accuracy assessment from which to derive the rangewide uncertainty of the sagebrush base layer; 4) LANDFIRE is consistently used in several recent analyses of sagebrush habitats (Knick et al. 2011; Leu and Hanser 2011; Knick and Hanser 2011); and 5) LANDFIRE EVT can be compared against the geographic extent of lands that are believed to have had the capability of supporting sagebrush vegetation pre-EuroAmerican settlement [LANDFIRE Biophysical Setting (BpS)]. This fifth reason provides a reference point for understanding how much sagebrush currently remains in a defined geographic area of interest compared with how much sagebrush existed historically (Measure 1b). Therefore, the BLM and the USFS have determined that LANDFIRE provides the best available data at broad and mid scales to serve as a sagebrush base layer for monitoring changes in the geographic extent of sagebrush. The BLM and the USFS, in addition to aggregating the sagebrush types into the sagebrush base layer, will aggregate the accuracy assessment reports from LANDFIRE to document the cumulative accuracy for the sagebrush base layer. The BLM-through its Assessment, Inventory, and Monitoring (AIM) program and, specifically, the BLM's landscape monitoring framework (Taylor et al. 2014) will provide field data to the LANDFIRE program to support continuous quality improvements of the LANDFIRE EVT layer. The sagebrush layer based on LANDFIRE EVT will allow for the mid-scale estimation of the existing percent of sagebrush across a variety of reporting units. This sagebrush base layer will be adjusted by changes in land cover and successful restoration for future calculations of sagebrush availability (Measures 1a and 1b).

This layer will also be used to determine the trend in other landscape indicators, such as patch size and number, patch connectivity, linkage areas, and landscape matrix and edge effects (Stiver et al. *in press*). In the future, changes in sagebrush availability, generated annually, will be included in the sagebrush base layer. The landscape metrics will be recalculated to examine changes in pattern and abundance of sagebrush at the various geographic boundaries. This information will be included in effectiveness monitoring (see Section B.5.1.2.4, "Effectiveness Monitoring" (p. 1824)).

Within the BLM, field office–wide existing vegetation classification mapping and inventories are available that provide a much finer level of data than what is provided through LANDFIRE. Where available, these finer-scale products will be useful for additional and complementary mid-scale indicators and local-scale analyses (see Section B.5.1.3, "Fine and Site Scales" (p. 1828)). The fact that these products are not available everywhere limits their utility for monitoring at the broad and mid scale, where consistency of data products is necessary across broader geographies.

The sagebrush layer based on LANDFIRE EVT will allow for the mid-scale estimation of existing percent sagebrush across a variety of reporting units. This sagebrush base layer will be adjusted by changes in land cover and successful restoration for future calculations of sagebrush availability (Measures 1a and 1b).

This layer will be used to determine the trend in other landscape indicators, e.g., patch size and number, patch connectivity, linkage areas, and landscape matrix and edge effects (Stiver et al. in press). In the future, changes in sagebrush availability, generated bi-annually, will be included in the sagebrush base layer. The landscape metrics will be recalculated to examine changes in pattern and abundance of sagebrush at the various geographic boundaries. This information will be included in effectiveness monitoring (see Section B.5.1.2.4, "Effectiveness Monitoring" (p. 1824)).

Data Sources for Establishing and Monitoring Sagebrush Availability

In much the same manner as how the LANDFIRE data was selected as the data source, described above, the criteria for selecting the datasets (see Table B.5, "Datasets for Establishing and Monitoring Changes in Sagebrush Activity" (p. 1809)) for establishing and monitoring the change in sagebrush availability, Measure 1, were threefold:

- Nationally consistent dataset available across the range
- Known level of confidence or accuracy in the dataset
- Continual maintenance of dataset and known update interval

Table B.5. Datasets for Establishing and Monitoring Changes in Sagebrush Activity

Dataset	Source	Update Interval	Most Recent Version Year	Use
BioPhysical Setting v1.1	LANDFIRE	Static	2008	Denominator for Sagebrush Availability (1.b.)
Existing Vegetation Type v1.2	LANDFIRE	Static	2010	Numerator for Sagebrush Availability
Cropland Data Layer	National Agricultural Statistics Service	Annual	2012	Agricultural Updates; removes existing sagebrush from numerator of sagebrush availability
National Land Cover Dataset Percent Imperviousness	Multi-Resolution Land Characteristics Consortium	5 Year	2011 available in March 2014	Urban Area Updates; removes existing sagebrush from numerator of sagebrush availability
Fire Perimeters	GeoMac	Annual	2013	< 1,000 acres Fire updates; removes existing sagebrush from numerator of sagebrush availability

Dataset	Source	Update Interval	Most Recent Version Year	Use
Burn Severity	Monitoring Trends in Burn Severity	Annual	2012 available in April 2014	> 1,000 acres Fire Updates; removes existing sagebrush from numerator of sagebrush availability except for unburned sagebrush islands
< less than > greater than				

LANDFIRE Existing Vegetation Type (EVT) Version 1.2

LANDFIRE EVT represents existing vegetation types on the landscape derived from remote sensing data. Initial mapping was conducted using imagery collected in approximately 2001. Since the initial mapping there have been two update efforts: version 1.1 represents changes before 2008, and version 1.2 reflects changes on the landscape before 2010. Version 1.2 will be used as the starting point to develop the sagebrush base layer.

Ecological systems from the LANDFIRE EVT to be used in the sagebrush base layer were determined by sage-grouse subject matter experts through the identification of the ecological systems that have the capability of supporting sagebrush vegetation and could provide suitable seasonal habitat for the sage-grouse (see Table B.6, "Ecological Systems in BpS and EVT Capable of Supporting Sagebrush Vegetation and Could Provide Suitable Seasonal Habitat for Greater Sage-Grouse" (p. 1810)). Two additional vegetation types that are not ecological systems were added to the EVT and are Artemisia tridentata ssp. vaseyana Shrubland Alliance and Quercus gambelii Shrubland Alliance. These alliances have species composition directly related to the Rocky Mountain Lower Montane - Foothill Shrubland ecological system and the Rocky Mountain Gambel Oak-Mixed Montane Shrubland ecological system, both of which are ecological systems in LANDFIRE BpS. In LANDFIRE EVT however, in some map zones, the Rocky Mountain Lower Montane - Foothill Shrubland ecological system and the Rocky Mountain Gambel Oak-Mixed Montane Shrubland ecological system were named Artemisia tridentata ssp. vaseyana Shrubland Alliance and Quercus gambelii Shrubland Alliance respectively.

Table B.6. Ecological Systems in BpS and EVT Capable of Supporting Sagebrush Vegetation and Could Provide Suitable Seasonal Habitat for Greater Sage-Grouse

Ecological System	Sagebrush Vegetation that the Ecological System has the Capability to Produce
Colorado Plateau Mixed Low Sagebrush Shrubland	*Artemisia arbuscula* ssp. *longiloba* *Artemisia bigelovii* *Artemisia nova* *Artemisia frigida* *Artemisia tridentata* ssp. *wyomingensis*
Columbia Plateau Scabland Shrubland	*Artemisia rigida*
Great Basin Xeric Mixed Sagebrush Shrubland	*Artemisia arbuscula* ssp. *longicaulis* *Artemisia arbuscula* ssp. *longiloba* *Artemisia nova* *Artemisia tridentata* ssp. *wyomingensis*
Inter-Mountain Basins Big Sagebrush Shrubland	*Artemisia tridentata* ssp. *tridentata* *Artemisia tridentata* ssp. *xericensis* *Artemisia tridentata* ssp. *vaseyana* *Artemisia tridentata* ssp. *wyomingensis*

Ecological System	Sagebrush Vegetation that the Ecological System has the Capability to Produce
Inter-Mountain Basins Mixed Salt Desert Scrub	*Artemisia tridentata* ssp. *wyomingensis* *Artemisia spinescens*
Wyoming Basins Dwarf Sagebrush Shrubland and Steppe	*Artemisia arbuscula* ssp. *longiloba* *Artemisia nova* *Artemisia tridentata* ssp. *wyomingensis* *Artemisia tripartita* ssp. *rupicola*
Columbia Plateau Low Sagebrush Steppe	*Artemisia arbuscula* *Artemisia arbuscula* ssp. *longiloba* *Artemisia nova*
Inter-Mountain Basins Big Sagebrush Steppe	*Artemisia cana* ssp. *cana* *Artemisia tridentata* ssp. *tridentata* *Artemisia tridentata* ssp. *xericensis* *Artemisia tridentata* ssp. *wyomingensis* *Artemisia tripartita* ssp. *tripartita* *Artemisia frigida*
Inter-Mountain Basins Montane Sagebrush Steppe	*Artemisia tridentata* ssp. *vaseyana* *Artemisia tridentata* ssp. *wyomingensis* *Artemisia nova* *Artemisia arbuscula* *Artemisia tridentata* ssp. *spiciformis*
Northwestern Great Plains Mixed grass Prairie	*Artemisia cana* ssp. *cana* *Artemisia tridentata* ssp. *vaseyana* *Artemisia frigida*
Northwestern Great Plains Shrubland	*Artemisia cana* ssp. *cana* *Artemisia tridentata* ssp. *tridentata* *Artemisia tridentata* ssp. *wyomingensis*
Western Great Plains Sand Prairie	*Artemisia cana* ssp. *cana*
Western Great Plains Floodplain Systems	*Artemisia cana* ssp. *cana*
Columbia Plateau Steppe and Grassland	*Artemisia* spp.
Inter-Mountain Basins Semi-Desert Shrub-Steppe	*Artemisia tridentata* *Artemisia bigelovii* *Artemisia tridentata* ssp. *wyomingensis*
Rocky Mountain Lower Montane-Foothill Shrubland	*Artemisia nova* *Artemisia tridentata* *Artemisia frigida*
Rocky Mountain Gambel Oak-Mixed Montane Shrubland	*Artemisia tridentata*
Inter-Mountain Basins Curl-Leaf Mountain Mahogany Woodland and Shrubland	*Artemisia tridentata* ssp. *vaseyana* *Artemisia arbuscula* *Artemisia tridentata*
Artemisia tridentata ssp. *vaseyana* Shrubland Alliance (EVT only)	*Artemisia tridentata ssp. vaseyana*
Quercus gambelii Shrubland Alliance (EVT only)	*Artemisia tridentata*

Accuracy and Appropriate Use of LANDFIRE Datasets

Because of concerns over the thematic accuracy of individual classes mapped by LANDFIRE, all ecological systems listed in Table 4 will be merged into one value that represents the sagebrush base layer. With all ecological systems aggregated, the combined accuracy of the sagebrush base layer (EVT) will be much greater than if all categories were treated separately.

LANDFIRE performed the original accuracy assessment of their EVT product on a map zone basis. There are 20 LANDFIRE map zones that cover the historic range of sage-grouse as defined by Schroeder (2004). Attachment C lists the user and producer accuracies for the aggregated ecological systems that make up the sagebrush base layer and also defines user and producer

accuracies. The aggregated sagebrush base layer for monitoring had producer accuracies ranging from 56.7 percent to 100 percent and user accuracies ranging from 57.1 percent to 85.7 percent.

LANDFIRE EVT data are not designed to be used at a local level. In reports of the percent sagebrush statistic for the various reporting units (Measure 1a), the uncertainty of the percent sagebrush will increase as the size of the reporting unit gets smaller. LANDFIRE data should never be used at the 30m pixel level (900m2 resolution of raster data) for any reporting. The smallest geographic extent for using the data to determine percent sagebrush is at the PAC level; for the smallest PACs, the initial percent sagebrush estimate will have greater uncertainties compared with the much larger PACs.

Agricultural Adjustments for the Sagebrush Base Layer

The dataset for the geographic extent of agricultural lands will come from the National Agricultural Statistics Service (NASS) Cropland Data Layer (CDL) (http://www.nass.usda.gov/research/Cropland/Release/index.htm). CDL data are generated annually, with estimated producer accuracies for "large area row crops ranging from the mid 80% to mid-90%," depending on the state (http://www.nass.usda.gov/research/Cropland/sarsfaqs2.htm#Section3_18.0). Specific information on accuracy may be found on the NASS metadata website (http://www.nass.usda.gov/research/Cropland/metadata/meta.htm). CDL provided the only dataset that matches the three criteria (nationally consistent, known level of accuracy, and periodically updated) for use in this monitoring framework and represents the best available agricultural lands mapping product.

The CDL data contain both agricultural classes and nonagricultural classes. For this effort, and in the baseline environmental report (Manier et al. 2013), nonagricultural classes were removed from the original dataset. The excluded classes are:

> Barren (65 & 131), Deciduous Forest (141), Developed/High Intensity (124), Developed/Low Intensity (122), Developed/Med Intensity (123), Developed/Open Space (121), Evergreen Forest (142), Grassland Herbaceous (171), Herbaceous Wetlands (195), Mixed Forest (143), Open Water (83 & 111), Other Hay/Non Alfalfa (37), Pasture/Hay (181), Pasture/Grass (62), Perennial Ice/Snow (112), Shrubland (64 & 152), Woody Wetlands (190).

The rule set for adjusting the sagebrush base layer for agricultural lands (and for updating the base layer for agricultural lands in the future) is that once an area is classified as agriculture in any year of the CDL, those pixels will remain out of the sagebrush base layer even if a new version of the CDL classifies that pixel as one of the nonagricultural classes listed above. The assumption is that even though individual pixels may be classified as a nonagricultural class in any given year, the pixel has not necessarily been restored to a natural sagebrush community that would be included in Table 4. A further assumption is that once an area has moved into agricultural use, it is unlikely that the area would be restored to sagebrush. Should that occur, however, the method and criteria for adding pixels back into the sagebrush base layer would follow those found in the Sagebrush Restoration Monitoring section of this monitoring framework.

Urban Adjustments for the Sagebrush Base Layer

The National Land Cover Dataset (NLCD) Percent Imperviousness was selected as the best available dataset to be used for urban updates. These data are generated on a five-year cycle and specifically designed to support monitoring efforts. Other datasets were evaluated and lacked

the spatial specificity that was captured in the NLCD product. Any new impervious pixel will be removed from the sagebrush base layer during the update process. Although the impervious surface layer includes a number of impervious pixels outside of urban areas, there are two reasons why this is acceptable for this process. First, an evaluation of national urban area datasets did not reveal a layer that could be confidently used in conjunction with the NLCD product to screen impervious pixels outside of urban zones because unincorporated urban areas were not being included thus leaving large chunks of urban pixels unaccounted for in this rule set. Secondly, experimentation with setting a threshold on the percent imperviousness layer that would isolate rural features proved to be unsuccessful. No combination of values could be identified that would result in the consistent ability to limit impervious pixels outside urban areas. Therefore, to ensure consistency in the monitoring estimates, it was determined to include all impervious pixels.

Fire Adjustments for the Sagebrush Base Layer

Two datasets were selected for performing fire adjustments and updates: GeoMac fire perimeters and Monitoring Trends in Burn Severity (MTBS). An existing data standard in the BLM requires that all fires of more than 10 acres are to be reported to GeoMac; therefore, there will be many small fires of less than 10 acres that will not be accounted for in the adjustment and monitoring attributable to fire. Using fire perimeters from GeoMac, all sagebrush pixels falling within the perimeter of fires less than 1,000 acres will be used to adjust and monitor the sagebrush base layer.

For fires greater than 1,000 acres, MTBS was selected as a means to account for unburned sagebrush islands during the update process of the sagebrush base layer. The MTBS program (http://www.mtbs.gov) is an ongoing, multiyear project to map fire severity and fire perimeters consistently across the United States. One of the burn severity classes within MTBS is an unburned to low-severity class. This burn severity class will be used to represent unburned islands of sagebrush within the fire perimeter for the sagebrush base layer. Areas within the other severity classes within the fire perimeter will be removed from the base sagebrush layer during the update process. Not all wildfires, however, have the same impacts on the recovery of sagebrush habitat, depending largely on soil moisture and temperature regimes. For example, cooler, moister sagebrush habitat has a higher potential for recovery or, if needed, restoration than does the warmer, dryer sagebrush habitat. These cooler, moister areas will likely be detected as sagebrush in future updates to LANDFIRE.

Conifer Encroachment Adjustment for the Sagebrush Base Layer

Conifer encroachment into sagebrush vegetation reduces the spatial extent of sage-grouse habitat (Davies et al. 2011; Baruch-Mordo et al. 2013). Conifer species that show propensity for encroaching into sagebrush vegetation resulting in sage-grouse habitat loss include various juniper species, such as Utah juniper (*Juniperus osteosperma*), western juniper (*Juniperus occidentalis*), Rocky Mountain juniper (*Juniperus scopulorum*), pinyon species, including singleleaf pinyon (*Pinus monophylla*) and pinyon pine (*Pinus edulis*), ponderosa pine (*Pinus ponderosa*), lodgepole pine (*Pinus contorta*), and Douglas fir (*Pseudotsuga menziesii*) (Gruell et al. 1986; Grove et al. 2005; Davies et al. 2011).

A rule set for conifer encroachment was developed to be used for determination of the existing sagebrush base layer. To capture the geographic extent of sagebrush that is likely to experience conifer encroachment, ecological systems within LANDFIRE EVT version 1.2 (NatureServe 2011) were identified if they have the capability of supporting the conifer species (listed above) and have the capability of supporting sagebrush vegetation. Those ecological systems (see Table B.7, "Ecological Systems with Conifers Most Likely to Encroach into Sagebrush

Vegetation ” (p. 1814)) were deemed to be the plant communities with conifers most likely to encroach into sagebrush vegetation. Sagebrush vegetation was defined as including sagebrush species (Attachment B) that provide habitat for the Greater Sage-Grouse and are included in the Sage-Grouse Habitat Assessment Framework. An adjacency analysis was conducted to identify all sagebrush pixels that were directly adjacent to these conifer ecological systems and these immediately adjacent sagebrush pixels were removed from the sagebrush base layer.

Table B.7. Ecological Systems with Conifers Most Likely to Encroach into Sagebrush Vegetation

EVT Ecological Systems	Coniferous Species and Sagebrush Vegetation that the Ecological System has the Capability to Produce
Colorado Plateau Pinyon-Juniper Woodland	*Pinus edulis* *Juniperus osteosperma* *Artemisia tridentata* *Artemisia arbuscula* *Artemisia nova* *Artemisia tridentata* ssp. *tridentata* *Artemisia tridentata* ssp. *wyomingensis* *Artemisia tridentata* ssp. *vaseyana* *Artemisia bigelovii* *Artemisia pygmaea*
Columbia Plateau Western Juniper Woodland and Savanna	*Juniperus occidentalis* *Pinus ponderosa* *Artemisia tridentata* *Artemisia arbuscula* *Artemisia rigida* *Artemisia tridentata* ssp. *vaseyana*
East Cascades Oak-Ponderosa Pine Forest and Woodland	*Pinus ponderosa* *Pseudotsuga menziesii* *Artemisia tridentata* *Artemisia nova*
Great Basin Pinyon-Juniper Woodland	*Pinus monophylla* *Juniperus osteosperma* *Artemisia arbuscula* *Artemisia nova* *Artemisia tridentata* *Artemisia tridentata* ssp. *vaseyana*
Northern Rocky Mountain Ponderosa Pine Woodland and Savanna	*Pinus ponderosa* *Artemisia tridentata* *Artemisia arbuscula* *Artemisia tridentata* ssp. *vaseyana*
Rocky Mountain Foothill Limber Pine-Juniper Woodland	*Juniperus osteosperma* *Juniperus scopulorum* *Artemisia nova* *Artemisia tridentata*
Rocky Mountain Poor-Site Lodgepole Pine Forest	*Pinus contorta* *Pseudotsuga menziesii* *Pinus ponderosa* *Artemisia tridentata*

EVT Ecological Systems	Coniferous Species and Sagebrush Vegetation that the Ecological System has the Capability to Produce
Southern Rocky Mountain Pinyon-Juniper Woodland	*Pinus edulis* *Juniperus monosperma* *Artemisia bigelovii* *Artemisia tridentata* *Artemisia tridentata* ssp. *wyomingensis* *Artemisia tridentata* ssp.*vaseyana*
Southern Rocky Mountain Ponderosa Pine Woodland	*Pinus ponderosa* *Pseudotsuga menziesii* *Pinus edulis* *Pinus contorta* *Juniperus* spp. *Artemisia nova* *Artemisia tridentata* *Artemisia arbuscula* *Artemisia tridentata* ssp. *vaseyana*

Invasive Annual Grasses Adjustments for the Sagebrush Base Layer

There are no invasive species datasets from 2010 to the present (beyond the LANDFIRE data) that meet the three criteria (nationally consistent, known level of accuracy, and periodically updated) for use in the determination of the sagebrush base layer. For a description of how invasive species land cover will be incorporated in the sagebrush base layer in the future, see the Monitoring Sagebrush Availability section below.

Sagebrush Restoration Adjustments for the Sagebrush Base Layer

There are no datasets from 2010 to the present that could provide additions to the sagebrush base layer from restoration treatments that meet the three criteria (nationally consistent, known level of accuracy, and periodically updated); therefore, no adjustments were made to the sagebrush base layer calculated from the LANDFIRE EVT (version 1.2) attributable to restoration activities since 2010. Successful restoration treatments before 2010 are assumed to have been captured in the LANDFIRE refresh.

b. Monitoring Sagebrush Availability

Updating the Sagebrush Availability Sagebrush Base Layer

Sagebrush availability will be updated annually by incorporating changes to the sagebrush base layer attributable to agriculture, urbanization, and wildfire. The monitoring schedule for the existing sagebrush base layer updates is as follows:

2010 Existing Sagebrush Base Layer = [Sagebrush EVT] minus [2006 Imperviousness Layer] minus [2009 and 2010 CDL] minus [2009/10 GeoMac Fires < 1,000 acres] minus [2009/10 MTBS Fires excluding unburned sagebrush islands] minus [Conifer Encroachment Layer]

2012 Existing Sagebrush Update = [Base 2010 Existing Sagebrush Layer] minus [2011 Imperviousness Layer] minus [2011 and 2012 CDL] minus [2011/12 GeoMac Fires < 1,000 acres] minus [2011/12 MTBS Fires that are greater than 1,000 acres, excluding unburned sagebrush islands within the perimeter]

2013 and beyond Existing Sagebrush Updates = [Previous Existing Sagebrush Update Layer] minus [Imperviousness Layer (if new data are available)] minus [Next 2 years of CDL] minus [Next 2 years of GeoMac Fires < 1,000 acres] minus [Next 2 years MTBS Fires that

are greater than 1,000 acres, excluding unburned sagebrush islands within the perimeter] plus [restoration/monitoring data provided by the field]

Sagebrush Restoration Updates

Restoration after fire, after agricultural conversion, after seedings of introduced grasses, or after treatments of pinyon pine and/or juniper, are examples of updates to the sagebrush base layer that can add sagebrush vegetation back in. When restoration has been determined to be successful through range wide, consistent, interagency fine and site-scale monitoring, the polygonal data will be used to add sagebrush pixels back into the broad and mid-scale sagebrush base layer.

Measure 1b – Context for the change in the amount of sagebrush in a landscape of interest

Measure 1b describes the amount of sagebrush on the landscape of interest compared with the amount of sagebrush the landscape of interest could ecologically support. Areas with the potential to support sagebrush were derived from the BpS data layer that describes sagebrush pre Euro-American settlement (biophysical setting (BpS) v1.2 of LANDFIRE). This measure (1b) will provide information during evaluations of monitoring data to set the context for a given geographic area of interest. The information could also be used to inform management options for restoration, mitigation and inform effectiveness monitoring.

The identification and spatial locations of natural plant communities (vegetation) that are believed to have existed on the landscape (BpS) were constructed based on an approximation of the historical (pre Euro-American settlement) disturbance regime and how the historical disturbance regime operated on the current biophysical environment. BpS is composed of map units which are based on NatureServe's (2011) terrestrial ecological systems classification.

The ecological systems within BpS used for this monitoring framework are those ecological systems that have the capability of supporting sagebrush vegetation and could provide seasonal habitat for the sage-grouse. These ecological systems are listed in Table 4 with the exception of the Artemisia tridentata ssp. vaseyana Shrubland Alliance and the Quercus gambelii Shrubland Alliance. Ecological systems selected included sagebrush species or subspecies that are included in the Sage-Grouse Habitat Assessment Framework and are found in Attachment B.

Attributable to the lack of any reference data, the BpS layer does not have an associated accuracy assessment. Visual inspection, however, of the BpS data reveals inconsistencies in the labeling of pixels among LANDFIRE map zones. The reason for these inconsistencies between map zones are the decision rules used to map a given ecological system will vary between map zones based on different physical, biological, disturbance and atmospheric regimes of the region. This can result in artificial edges in the map that are an artifact of the mapping process. However, metrics will be calculated at broad spatial scales using BpS potential vegetation type, not small groupings or individual pixels, therefore, the magnitude of these observable errors in the BpS layer is minor compared with the size of the reporting units. Therefore, since BpS will be used to identify broad landscape patterns of dominant vegetation, these inconsistencies will only have a minor impact on the percent sagebrush availability calculation.

LANDFIRE BpS data are not designed to be used at a local level. In reporting the percent sagebrush statistic for the various reporting units, the uncertainty of the percent sagebrush will increase as the size of the reporting unit gets smaller. LANDFIRE data should never be used at the pixel level (30m2) for any reporting. The smallest geographic extent use of the data for this

purpose is at the PAC level and for the smallest PACs the initial percent sagebrush remaining estimate will have greater uncertainties compared with the much larger PACs.

Tracking

BLM and USFS will analyze and monitor sagebrush availability (Measure 1) on a bi-annual basis and it will be used to inform effectiveness monitoring and initiate adaptive management actions as necessary. The 2010 estimate of sagebrush availability will serve as the base year and an updated estimate for 2012 will be reported in 2014 after all datasets become available. The 2012 estimate will capture changes attributable to fire, agriculture, and urban development. Subsequent updates will always include new fire and agricultural data and new urban data when available. Restoration data that meets criteria of adding sagebrush areas back into the sagebrush base layer will begin to be factored in as data allows. Attributable to data availability, there will be a two year lag (approximately) between when the estimate is generated and when the data used for the estimate becomes available (e.g., the 2014 sagebrush availability will be included in the 2016 estimate).

Future Plans

Geospatial data used to generate the sagebrush base layer will be available through BLM's EGIS Web Portal and Geospatial Gateway or through the authoritative data source. Legacy datasets will be preserved, so that trends may be calculated. Additionally, accuracy assessment data for all source datasets will be provided on the portal either spatially, where applicable, or through the metadata. Accuracy assessment information was deemed vital to share to help users understand the limitation of the sagebrush estimates and will be summarized spatially by map zone and included in the Portal.

LANDFIRE plans to begin a remapping effort in 2015. This remapping has the potential to greatly improve overall quality of the data products primarily through the use of higher quality remote sensing datasets. Additionally, BLM and the Multi-Resolution Land Characteristics Consortium (MRLC) are working to improve the accuracy of vegetation map products for broad and mid-scale analyses through the Grass/Shrub mapping effort in partnership with the MRLC. The Grass/Shrub mapping effort applies the Wyoming multi-scale sagebrush habitat methodology (Homer et al. 2009) to spatially depict fractional percent cover estimates for five components range and west-wide. These five components are percent cover of sagebrush vegetation, percent bare ground, percent herbaceous vegetation (grass and forbs combined), annual vegetation, and percent shrubs. One of the benefits of the design of these fractional cover maps is that they facilitate monitoring "with-in" class variation (e.g., examination of declining trend in sagebrush cover for individual pixels). This "with-in" class variation can serve as one indicator of sagebrush quality that cannot be derived from LANDFIRE's EVT information. The Grass/Shrub effort is not a substitute for fine scale monitoring, but will leverage fine scale data to support the validation of the mapping products. An evaluation will be conducted to determine if either dataset is of great enough quality to warrant replacing the existing sagebrush layers. The earliest possible date for this evaluation will not occur until 2018 or 2019 depending on data availability.

B.5.1.2.2.2. Habitat Degradation Monitoring (Measure 2)

The measure of habitat degradation will be calculated by combining the footprints of threats identified in Table 2. The footprint is defined as the direct area of influence of "active" energy and infrastructure; it is used as a surrogate for human activity. Although these analyses will try to summarize results at the aforementioned meaningful geographic areas of interest, some may

be too small to report the metrics appropriately and may be combined (smaller populations, PACs within a population, etc.). Data sources for each threat are found in Table 6, Geospatial data sources for habitat degradation. Specific assumptions (inclusion criteria for data, width/area assumptions for point and line features, etc.) and methodology for each threat, and the combined measure, are detailed below. All datasets will be updated annually to monitor broad- and mid-scale year-to-year changes and to calculate trends in habitat degradation to inform adaptive management. A 5-year summary report will be provided to the USFWS.

a. Habitat Degradation Datasets and Assumptions

Energy (oil and gas wells and development facilities)

This dataset will compile information from three oil and gas databases: the proprietary IHS Enerdeq database, the BLM Automated Fluid Minerals Support System (AFMSS) database, and the proprietary Platts (a McGraw-Hill Financial Company) GIS Custom Data (hereafter, Platts) database of power plants. Point data from wells active within the last 10 years from IHS and producing wells from AFMSS will be considered as a 5-acre (2.0ha) direct area of influence centered on the well point, as recommended by the BLM WO-300 (Minerals and Realty Management). Plugged and abandoned wells will be removed if the date of well abandonment was before the first day of the reporting year (i.e., for the 2015 reporting year, a well must have been plugged and abandoned by 12/31/2014 to be removed). Platts oil and gas power plants data (subset to operational power plants) will also be included as a 5-acre (2.0ha) direct area of influence.

Additional Measure: Reclaimed Energy-related Degradation

This dataset will include those wells that have been plugged and abandoned. This measure thereby attempts to measure energy-related degradation that has been reclaimed but not necessarily fully restored to sage-grouse habitat. This measure will establish a baseline by using wells that have been plugged and abandoned within the last 10 years from the IHS and AFMSS datasets. Time lags for lek attendance in response to infrastructure have been documented to be delayed 2–10 years from energy development activities (Harju et al. 2010). Reclamation actions may require 2 or more years from the Final Abandonment Notice. Sagebrush seedling establishment may take 6 or more years from the point of seeding, depending on such variables as annual precipitation, annual temperature, and soil type and depth (Pyke 2011). This 10-year period is conservative and assumes some level of habitat improvement 10 years after plugging. Research by Hemstrom et al. (2002), however, proposes an even longer period—more than 100 years—for recovery of sagebrush habitats, even with active restoration approaches. Direct area of influence will be considered 3 acres (1.2ha) (J. Perry, personal communication, February 12, 2014). This additional layer/measure could be used at the broad and mid scale to identify areas where sagebrush habitat and/or potential sagebrush habitat is likely still degraded. This layer/measure could also be used where further investigation at the fine or site scale would be warranted to: (1) quantify the level of reclamation already conducted, and (2) evaluate the amount of restoration still required for sagebrush habitat recovery. At a particular level (e.g., population, PACs), these areas and the reclamation efforts/success could be used to inform reclamation standards associated with future developments. Once these areas have transitioned from reclamation standards to meeting restoration standards, they can be added back into the sagebrush availability layer using the same methodology as described for adding restoration treatment areas lost to wildfire and agriculture conversion (see the Monitoring Sagebrush Restoration under the Monitoring Sagebrush Availability section). This dataset will be updated annually from the IHS dataset.

Energy (coal mines)

Currently, there is no comprehensive dataset available that identifies the footprint of active coal mining across all jurisdictions. Therefore, point and polygon datasets will be used each year to identify coal mining locations. Data sources will be identified and evaluated annually and will include at a minimum: BLM coal lease polygons, U.S. Energy Information Administration mine occurrence points, U.S. Office of Surface Mining Reclamation and Enforcement coal mining permit polygons (as available), and U.S. Geological Survey (USGS) Mineral Resources Data System mine occurrence points. These data will inform where active coal mining may be occurring. Additionally, coal power plant data from Platts power plants database (subset to operational power plants) will be included. Aerial imagery will then be used to digitize manually the active coal mining and coal power plants surface disturbance in or near these known occurrence areas. While the date of aerial imagery varies by scale, the most current data available from Esri and/or Google will be used to locate (generally at 1:50,000 and below) and digitize (generally at 1:10,000 and below) active coal mine and power plant direct area of influence. Coal mine location data source and imagery date will be documented for each digitized coal polygon at the time of creation. Subsurface facility locations (polygon or point location as available) will also be collected if available, included in density calculations, and added to the active surface activity layer as appropriate (if an actual direct area of influence can be located).

Energy (wind energy facilities)

This dataset will be a subset of the Federal Aviation Administration (FAA) Digital Obstacles point file. Points where "Type_" = "WINDMILL" will be included. Direct area of influence of these point features will be measured by converting to a polygon dataset as a direct area of influence of 3 acres (1.2 hectares) centered on each tower point. See the BLM's "Wind Energy Development Programmatic Environmental Impact Statement" (BLM 2005). Additionally, Platts power plants database will be used for transformer stations associated with wind energy sites (subset to operational power plants), also with a 3-acre (1.2 hectares) direct area of influence.

Energy (solar energy facilities)

This dataset will include solar plants as compiled with the Platts power plants database (subset to operational power plants). This database includes an attribute that indicates the operational capacity of each solar power plant. Total capacity at the power plant was based on ratings of the in-service unit(s), in megawatts. Direct area of influence polygons will be centered over each point feature representing 7.3 acres (3.0 hectares) per megawatt of the stated operational capacity, per the report of the National Renewable Energy Laboratory (NREL), "Land-Use Requirements for Solar Power Plants in the United States" (Ong et al. 2013).

Energy (geothermal energy facilities)

This dataset will include geothermal wells in existence or under construction as compiled with the IHS wells database and power plants as compiled with the Platts database (subset to operational power plants). Direct area of influence of these point features will be measured by converting to a polygon dataset of 3 acres (1.2 hectares) centered on each well or power plant point.

Mining (active developments; locatable, leasable, saleable)

This dataset will include active locatable mining locations as compiled with the proprietary InfoMine database. Aerial imagery will then be used to digitize manually the active mining surface disturbance in or near these known occurrence areas. While the date of aerial imagery varies by scale, the most current data available from Esri and/or Google will be used to locate

(generally at 1:50,000 and below) and digitize (generally at 1:10,000 and below) active mine direct area of influence. Mine location data source and imagery date will be documented for each digitized polygon at the time of creation. Currently, there are no known compressive databases available for leasable or saleable mining sites beyond coal mines. Other data sources will be evaluated and used as they are identified or as they become available. Point data may be converted to polygons to represent direct area of influence unless actual surface disturbance is available.

Infrastructure (roads)

This dataset will be compiled from the proprietary Esri StreetMap Premium for ArcGIS. Dataset features that will be used are: Interstate Highways, Major Roads, and Surface Streets to capture most paved and "crowned and ditched" roads while not including "two-track" and 4-wheel-drive routes. These minor roads, while not included in the broad- and mid-scale monitoring, may support a volume of traffic that can have deleterious effects on sage-grouse leks. It may be appropriate to consider the frequency and type of use of roads in a NEPA analysis for a proposed project. This fine- and site-scale analysis will require more site-specific data than is identified in this monitoring framework. The direct area of influence for roads will be represented by 240.2 feet, 84.0 feet, and 40.7 feet (73.2 meters, 25.6 meters, and 12.4 meters) total widths centered on the line feature for Interstate Highways, Major Roads, and Surface Streets, respectively (Knick et al. 2011). The most current dataset will be used for each monitoring update. Note: This is a related but different dataset than what was used in BER (Manier et al. 2013). Individual BLM/USFS planning units may use different road layers for fine- and site-scale monitoring.

Infrastructure (railroads)

This dataset will be a compilation from the Federal Railroad Administration Rail Lines of the USA dataset. Non-abandoned rail lines will be used; abandoned rail lines will not be used. The direct are of influence for railroads will be represented by a 30.8 feet (9.4 meters) total width (Knick et al. 2011) centered on the non-abandoned railroad line feature.

Infrastructure (power lines)

This line dataset will be derived from the proprietary Platts transmission lines database. Linear features in the dataset attributed as "buried" will be removed from the disturbance calculation. Only "In Service" lines will be used; "Proposed" lines will not be used. Direct area of influence will be determined by the kV designation: 1–199 kV (100 feet/30.5 meters), 200–399 kV (150 feet/45.7 meters), 400–699 kV (200 feet/61.0 meters), and 700-or greater kV (250 feet/76.2 meters) based on average right-of-way and structure widths, according to BLM WO-300 (Minerals and Realty Management).

Infrastructure (communication towers)

This point dataset will be compiled from the Federal Communications Commission (FCC) communication towers point file; all duplicate points will be removed. It will be converted to a polygon dataset by using a direct area of influence of 2.5 acres (1.0 hectare) centered on each communication tower point (Knick et al. 2011).

Infrastructure (other vertical structures)

This point dataset will be compiled from the FAA's Digital Obstacles point file. Points where "Type_" = "WINDMILL" will be removed. Duplicate points from the FCC communication towers point file will be removed. Remaining features will be converted to a polygon dataset

using a direct area of influence of 2.5 acres (1.0 hectare) centered on each vertical structure point (Knick et al. 2011).

Other Developed Rights-of-Way

Currently, no additional data sources for other rights-of-way have been identified; roads, power lines, railroads, pipelines, and other known linear features are represented in the categories described above. The newly purchased IHS data do contain pipeline information; however, this database does not currently distinguish between above-ground and underground pipelines. If additional features representing human activities are identified, they will be added to monitoring reports using similar assumptions to those used with the threats described above.

b. Habitat Degradation Threat Combination and Calculation

The threats targeted for measuring human activity (see Table B.8, "Geospatial Data Sources for Habitat Degradation (Measure 2)" (p. 1821)) will be converted to direct area of influence polygons as described for each threat above. These threat polygon layers will be combined and features dissolved to create one overall polygon layer representing footprints of active human activity in the range of sage-grouse. Individual datasets, however, will be preserved to indicate which types of threats may be contributing to overall habitat degradation. This measure has been divided into three submeasures to describe habitat degradation on the landscape. Percentages will be calculated as follows:

Measure 2a. Footprint by geographic area of interest: Divide area of the active/direct footprint by the total area of the geographic area of interest (% disturbance in geographic area of interest).

Measure 2b. Active/direct footprint by historical sagebrush potential: Divide area of the active footprint that coincides with areas with historical sagebrush potential (BpS calculation from habitat availability) within a given geographic area of interest by the total area with sagebrush potential within the geographic area of interest (% disturbance on potential historical sagebrush in geographic area of interest).

Measure 2c. Active/direct footprint by current sagebrush: Divide area of the active footprint that coincides with areas of existing sagebrush (EVT calculation from habitat availability) within a given geographic area of interest by the total area that is current sagebrush within the geographic area of interest (% disturbance on current sagebrush in geographic area of interest).

Table B.8. Geospatial Data Sources for Habitat Degradation (Measure 2)

Degradation Type	Subcategory	Data Source	Direct Area of Influence	Area Source
Energy (oil & gas)	Wells	IHS; BLM (AFMSS)	5.0 acres (2.0 hectares)	BLM WO-300
	Power Plants	Platts (power plants)	5.0 acres (2.0 hectares)	BLM WO-300
Energy (coal)	Mines	BLM; USFS; Office of Surface Mining Reclamation and Envofrement; USGS Mineral Resources Data System	Polygon area (digitized)	Esri/ Google Imagery
	Power Plants	Platts (power plants)	Polygon area (digitized)	Esri Imagery

Degradation Type	Subcategory	Data Source	Direct Area of Influence	Area Source
Energy (wind)	Wind Turbines	Federal Aviation Administration	3.0 acres (1.2 hectares)	BLM WO-300
	Power Plants	Platts (power plants)	3.0 acres (1.2 hectares)	BLM WO-300
Energy (solar)	Fields/Power Plants	Platts (power plants)	7.3 acres (3.0 hectares)/megawatt	NREL
Energy (geothermal)	Wells	IHS	3.0 acres (1.2 hectares)	BLM WO-300
	Power Plants	Platts (power plants)	Polygon area (digitized)	Esri Imagery
Mining	Locatable Developments	InfoMine	Polygon area (digitized)	Esri Imagery
Infrastructure (roads)	Surface Streets (Minor Roads)	Esri StreetMap Premium	40.7 feet (12.4 meters)	USGS
	Major Roads	Esri StreetMap Premium	84.0 feet (25.6 meters)	USGS
	Interstate Highways	Esri StreetMap Premium	240.2 feet (73.2 meters)	USGS
Infrastructure (railroads)	ActiveLines	Federal Railroad Administration	30.8 feet (9.4 meters)	USGS
Infrastructure (powerlines)	1-199 kV Lines	Platts (transmission lines)	100 feet (30.5 meters)	BLM WO-300
	200-399 kV Lines	Platts (transmission lines)	150 feet (45.7m)	BLM WO-300
	400-699 kV Lines	Platts (transmission lines)	200 feet (61.0 meters)	BLM WO-300
	700+ kV Lines	Platts (transmission lines)	250 feet (76.2 meters)	BLM WO-300
Infrastructure (communication	Towers	Federal Communications Commission	2.5 acres (1.0 hectare)	BLM WO-300

B.5.1.2.2.3. Energy and Mining Density (Measure 3)

The measure of density of energy and mining will be calculated by combining the locations of energy and mining threats identified in Table B.8, "Geospatial Data Sources for Habitat Degradation (Measure 2)" (p. 1821). This measure will provide an estimate of the intensity of human activity or the intensity of habitat degradation. The number of energy facilities and mining locations will be summed and divided by the area of meaningful geographic areas of interest to calculate density of these activities. Data sources for each threat are found in Table 6. Specific assumptions (inclusion criteria for data, width/area assumptions for point and line features, etc.) and methodology for each threat, and the combined measure, are detailed below. All datasets will be updated annually to monitor broad- and mid-scale year-to-year changes and 5-year (or longer) trends in habitat degradation.

a. Energy and Mining Density Datasets and Assumptions

Energy (oil and gas wells and development facilities) (See Section B.5.1.2.2.2, "Habitat Degradation Monitoring (Measure 2)" (p. 1817).)

Energy (coal mines) (See Section B.5.1.2.2.2, "Habitat Degradation Monitoring (Measure 2)" (p. 1817).)

Energy (wind energy facilities) (See Section B.5.1.2.2.2, "Habitat Degradation Monitoring (Measure 2)" (p. 1817).)
Energy (solar energy facilities) (See Section B.5.1.2.2.2, "Habitat Degradation Monitoring (Measure 2)" (p. 1817).)
Energy (geothermal energy facilities) (See Section B.5.1.2.2.2, "Habitat Degradation Monitoring (Measure 2)" (p. 1817).)
Mining (active developments; locatable, leasable, saleable) (See Section B.5.1.2.2.2, "Habitat Degradation Monitoring (Measure 2)" (p. 1817).)

b. Energy and Mining Density Threat Combination and Calculation

Datasets for energy and mining will be collected in two primary forms: point locations (e.g., wells) and polygon areas (e.g., surface coal mining). The following rule set will be used to calculate density for meaningful geographic areas of interest including standard grids and per polygon:

1. Point locations will be preserved; no additional points will be removed beyond the methodology described above. Energy facilities in close proximity (an oil well close to a wind tower) will be retained.
2. Polygons will not be merged, or features further dissolved. Thus, overlapping facilities will be retained, such that each individual threat will be a separate polygon data input for the density calculation.
3. The analysis unit (polygon or 640-acre section in a grid) will be the basis for counting the number of mining or energy facilities per unit area. Within the analysis unit, all point features will be summed, and any individual polygons will be counted as one (e.g., a coal mine will be counted as one facility within population). Where polygon features overlap multiple units (polygons or pixels), the facility will be counted as one in each unit where the polygon occurs (e.g., a polygon crossing multiple 640-acre sections would be counted as one in each 640-acre section for a density per 640-acre-section calculation).
4. In methodologies with different-sized units (e.g., MZs, populations, etc.) raw facility counts will be converted to densities by dividing the raw facility counts by the total area of the unit. Typically this will be measured as facilities per 640 acres.
5. For uniform grids, raw facility counts will be reported. Typically this number will also be converted to facilities per 640 acres.
6. Reporting may include summaries beyond the simple ones above. Zonal statistics may be used to smooth smaller grids to help display and convey information about areas within meaningful geographic areas of interest that have high levels of energy and/or mining activity.
7. Additional statistics for each defined unit may also include adjusting the area to include only the area with the historical potential for sagebrush (BpS) or areas currently sagebrush (EVT).

Individual datasets and threat combination datasets for habitat degradation will be available through the BLM's EGIS web portal and geospatial gateway. Legacy datasets will be preserved so that trends may be calculated.

B.5.1.2.3. Population (Demographics) Monitoring

State wildlife management agencies are responsible for monitoring sage-grouse populations within their respective states. WAFWA will coordinate this collection of annual population data by state agencies. These data will be made available to the BLM according to the terms of the forthcoming Greater Sage-Grouse Population Monitoring Memorandum of Understanding (MOU) (2014) between WAFWA and the BLM. The MOU outlines a process, timeline, and responsibilities for regular data sharing of sage-grouse population and/or habitat information for

the purposes of implementing sage-grouse LUPs/amendments and subsequent effectiveness monitoring. Population areas were refined from the "Greater Sage-grouse (Centrocercus urophasianus) Conservation Objectives: Final Report" (COT 2013) by individual state wildlife agencies to create a consistent naming nomenclature for future data analyses. These population data will be used for analysis at the applicable scale to supplement habitat effectiveness monitoring of management actions and to inform the adaptive management responses.

B.5.1.2.4. Effectiveness Monitoring

Effectiveness monitoring will provide the data needed to evaluate BLM and USFS actions toward reaching the objective of the national planning strategy (BLM IM 2012-044) – to conserve sage-grouse populations and their habitat– and the objectives for the land use planning area. Effectiveness monitoring methods described here will encompass multiple larger scales, from areas as large as the WAFWA MZ to the scale of the Buffalo LUP. Effectiveness data used for these larger-scale evaluations will include all lands in the area of interest, regardless of surface ownership/management, and will help inform where finer-scale evaluations are needed, such as population areas smaller than an LUP or PACs within an LUP (described in Section B.5.1.3, "Fine and Site Scales" (p. 1828)). Data will also include the trend of disturbance within these areas of interest to inform the need to initiate adaptive management responses as described in the Buffalo land use plan.

The BLM and the USFS will coordinate with the State of Wyoming in evaluating the compliance of all actions within a sage-grouse core area. Evaluation of current disturbance, disruptions and conservation actions within a SG core area will be conducted to determine if all entities are in compliance with their specific standards and whether or not it indeed has not caused declines of sg populations. This approach also helps focus scarce resources to areas experiencing habitat loss, degradation, or population declines, without excluding the possibility of concurrent, finer-scale evaluations as needed where habitat or population anomalies have been identified through some other means.

To determine the effectiveness of the sage-grouse national planning strategy, the BLM and the USFS will evaluate the answers to the following questions and prepare a broad- and mid-scale effectiveness report:

1. Sagebrush Availability and Condition:
    a. What is the amount of sagebrush availability and the change in the amount and condition of sagebrush?
    b. What is the existing amount of sagebrush on the landscape and the change in the amount relative to the pre-EuroAmerican historical distribution of sagebrush (BpS)?
    c. What is the trend and condition of the indicators describing sagebrush characteristics important to sage-grouse?
2. Habitat Degradation and Intensity of Activities:
    a. What is the amount of habitat degradation and the change in that amount?
    b. What is the intensity of activities and the change in the intensity?
    c. What is the amount of reclaimed energy-related degradation and the change in the amount?
    d. What is the population estimation of sage-grouse and the change in the population estimation?
3. How are the BLM and the USFS contributing to changes in the amount of sagebrush?
4. How are the BLM and the USFS contributing to disturbance?

The compilation of broad- and mid-scale data (and population trends as available) into an effectiveness monitoring report will occur on a 5-year reporting schedule (see Attachment A), which may be accelerated to respond to critical emerging issues (in consultation with the USFWS and state wildlife agencies). In addition, effectiveness monitoring results will be used to identify emerging issues and research needs and inform the BLM and the USFS adaptive management strategy (see the Adaptive Management section of this Environmental Impact Statement).

To determine the effectiveness of the sage-grouse objectives of the land use plan, the BLM and the USFS will evaluate the answers to the following questions and prepare a plan effectiveness report:

1. Is this plan meeting the sage-grouse habitat objectives?
2. Are sage-grouse areas within the LUP meeting, or making progress toward meeting, land health standards, including the Special Status Species/wildlife habitat standard?
3. Is the plan meeting the disturbance objective(s) within sage-grouse areas?
4. Are the sage-grouse populations within this plan boundary and within the sage-grouse areas increasing, stable, or declining?

The effectiveness monitoring report for this LUP will occur on a 5-year reporting schedule (see Attachment A) or more often if habitat or population anomalies indicate the need for an evaluation to facilitate adaptive management or respond to critical emerging issues. Data will be made available through the BLM's EGIS web portal and the geospatial gateway.

Methods

At the broad and mid scales (PACs and above) the BLM and the USFS will summarize the vegetation, disturbance, and (when available) population data. Although the analysis will try to summarize results for PACs within each sage-grouse population, some populations may be too small to report the metrics appropriately and may need to be combined to provide an estimate with an acceptable level of accuracy. Otherwise, they will be flagged for more intensive monitoring by the appropriate landowner or agency. The BLM and the USFS will then analyze monitoring data to detect the trend in the amount of sagebrush; the condition of the vegetation in the sage-grouse areas (MacKinnon et al. 2011); the trend in the amount of disturbance; the change in disturbed areas owing to successful restoration; and the amount of new disturbance the BLM and/or the USFS has permitted. These data could be supplemented with population data (when available) to inform an understanding of the correlation between habitat and PACs within a population. This overall effectiveness evaluation must consider the lag effect response of populations to habitat changes (Garton et al. 2011).

Calculating Question 1, National Planning Strategy Effectiveness: The amount of sagebrush available in the large area of interest will use the information from Measure 1a (see Section B.5.1.2.2.1, "Sagebrush Availability (Measure 1)" (p. 1807)) and calculate the change from the 2012 baseline to the end date of the reporting period. To calculate the change in the amount of sagebrush on the landscape to compare with the historical areas with potential to support sagebrush, the information from Measure 1b (see Section B.5.1.2.2.1, "Sagebrush Availability (Measure 1)" (p. 1807)) will be used. To calculate the trend in the condition of sagebrush at the mid scale, three sources of data will be used: the BLM's Grass/Shrub mapping effort (see Future Plans in Section B.5.1.2.2.1, "Sagebrush Availability (Measure 1)" (p. 1807)); the results from the calculation of the landscape indicators, such as patch size (described below); and the BLM's Landscape Monitoring Framework (LMF) and sage-grouse intensification effort (also described below). The LMF and sage-grouse intensification effort data are collected in a statistical sampling framework that allows calculation of indicator values at multiple scales.

Beyond the importance of sagebrush availability to sage-grouse, the mix of sagebrush patches on the landscape at the broad and mid scale provides the life requisite of space for sage-grouse dispersal needs (see the HAF). The configuration of sagebrush habitat patches and the land cover or land use between the habitat patches at the broad and mid scales also defines suitability. There are three significant habitat indicators that influence habitat use, dispersal, and movement across populations: the size and number of habitat patches, the connectivity of habitat patches (linkage areas), and habitat fragmentation (scope of unsuitable and non-habitats between habitat patches). The most appropriate commercial software to measure patch dynamics, connectivity, and fragmentation at the broad and mid scales will be used, along with the same data layers derived for sagebrush availability.

The BLM initiated the LMF in 2011 in cooperation with the Natural Resources Conservation Service (NRCS). The objective of the LMF effort is to provide unbiased estimates of vegetation and soil condition and trend using a statistically balanced sample design across BLM lands. Recognizing that sage-grouse populations are more resilient where the sagebrush plant community has certain characteristics unique to a particular life stage of sage-grouse (Knick and Connelly 2011, Stiver et al. in press), a group of sage-grouse habitat and sagebrush plant community subject matter experts identified those vegetation indicators collected at LMF sampling points that inform sage-grouse habitat needs. The experts represented the Agricultural Research Service, BLM, NRCS, USFWS, WAFWA, state wildlife agencies, and academia. The common indicators identified include: species composition, foliar cover, height of the tallest sagebrush and herbaceous plant, intercanopy gap, percent of invasive species, sagebrush shape, and bare ground. To increase the precision of estimates of sagebrush conditions within the range of sage-grouse, additional plot locations in occupied sage-grouse habitat (Sage-Grouse Intensification) were added in 2013. The common indicators are also collected on sampling locations in the NRCS National Resources Inventory Rangeland Resource Assessment (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/nri/?&cid=stelprdb1041620).

The sage-grouse intensification baseline data will be collected over a 5-year period, and an annual sage-grouse intensification report will be prepared describing the status of the indicators. Beginning in year 6, the annual status report will be accompanied with a trend report, which will be available on an annual basis thereafter, contingent on continuation of the current monitoring budget. This information, in combination with the Grass/Shrub mapping information, the mid-scale habitat suitability indicator measures, and the sagebrush availability information will be used to answer Question 1 of the National Planning Strategy Effectiveness Report.

Calculating Question 2, National Planning Strategy Effectiveness: Evaluations of the amount of habitat degradation and the intensity of the activities in the area of interest will use the information from Measure 2 (see Section B.5.1.2.2.2, “Habitat Degradation Monitoring (Measure 2)” (p. 1817)) and Measure 3 (see Section B.5.1.2.2.3, “Energy and Mining Density (Measure 3)” (p. 1822)). The field office will collect data on the amount of reclaimed energy-related degradation on plugged and abandoned and oil/gas well sites. The data are expected to demonstrate that the reclaimed sites have yet to meet the habitat restoration objectives for sage-grouse habitat. This information, in combination with the amount of habitat degradation, will be used to answer Question 2 of the National Planning Strategy Effectiveness Report.

Calculating Question 3, National Planning Strategy Effectiveness: The change in sage-grouse estimated populations will be calculated from data provided by the state wildlife agencies, when available. This population data (see Section B.5.1.2.3, “Population (Demographics)

Monitoring" (p. 1823)) will be used to answer Question 3 of the National Planning Strategy Effectiveness Report.

Calculating Question 4, National Planning Strategy Effectiveness: The estimated contribution by the BLM or the USFS to the change in the amount of sagebrush in the area of interest will use the information from Measure 1a (see Section B.5.1.2.2.1, "Sagebrush Availability (Measure 1)" (p. 1807)). This measure is derived from the national datasets that remove sagebrush (Table 3). To determine the relative contribution of BLM and USFS management, the current Surface Management Agency geospatial data layer will be used to differentiate the amount of change for each management agency for this measure in the geographic areas of interest. This information will be used to answer Question 4 of the National Planning Strategy Effectiveness Report.

Calculating Question 5, National Planning Strategy Effectiveness: The estimated contribution by the BLM or the USFS to the change in the amount of disturbance in the area of interest will use the information from Measure 2a (see Section B.5.1.2.2.2, "Habitat Degradation Monitoring (Measure 2)" (p. 1817)) and Measure 3 (see Section B.5.1.2.2.3, "Energy and Mining Density (Measure 3)" (p. 1822)). These measures are all derived from the national disturbance datasets that degrade habitat (Table 6). To determine the relative contribution of BLM and USFS management, the current Surface Management Agency geospatial data layer will be used to differentiate the amount of change for each management agency for these two measures in the geographic areas of interest. This information will be used to answer Question 5 of the National Planning Strategy Effectiveness Report.

Answers to the five questions for determining the effectiveness of the national planning strategy will identify areas that appear to be meeting the objectives of the strategy and will facilitate identification of population areas for more detailed analysis. Conceptually, if the broad-scale monitoring identifies increasing sagebrush availability and improving vegetation conditions, decreasing disturbance, and a stable or increasing population for the area of interest, there is evidence that the objectives of the national planning strategy to maintain populations and their habitats have been met. Conversely, where information indicates that sagebrush is decreasing and vegetation conditions are degrading, disturbance in sage-grouse areas is increasing, and/or populations are declining relative to the baseline, there is evidence that the objectives of the national planning strategy are not being achieved. Such a determination would likely result in a more detailed analysis and could be the basis for implementing more restrictive adaptive management measures.

With respect to the land use plan area, the BLM and the USFS will summarize the vegetation, disturbance, and population data to determine if the LUP is meeting the plan objectives. Effectiveness information used for these evaluations includes BLM/USFS surface management areas and will help inform where finer-scale evaluations are needed, such as seasonal habitats, corridors, or linkage areas. Data will also include the trend of disturbance within the sage-grouse areas, which will inform the need to initiate adaptive management responses as described in the Buffalo land use plan.

Calculating Question 1, Land Use Plan Effectiveness: The condition of vegetation and the allotments meeting land health standards (as articulated in "BLM Handbook 4180-1, Rangeland Health Standards") in sage-grouse areas will be used to determine the LUP's effectiveness in meeting the vegetation objectives for sage-grouse habitat set forth in the plan. The field office/ranger district will be responsible for collecting this data. In order for this data to be consistent and comparable, common indicators, consistent methods, and an unbiased sampling

framework will be implemented following the principles in the BLM's AIM strategy (Taylor et al. 2014; Toevs et al. 2011; MacKinnon et al. 2011), in the BLM's Technical Reference "Interpreting Indicators of Rangeland Health" (Pellant et al. 2005), and in the HAF (Stiver et al. in press) or other approved WAFWA MZ–consistent guidance to measure and monitor sage-grouse habitats. This information will be used to answer Question 1 of the Land Use Plan Effectiveness Report.

Calculating Question 2, Land Use Plan Effectiveness: Sage-grouse areas within the LUP that are achieving land health stands (or, if trend data are available, that are making progress toward achieving them)—particularly the Special Status Species/wildlife habitat land health standard—will be used to determine the LUP's effectiveness in achieving the habitat objectives set forth in the plan. Field offices will follow directions in "BLM Handbook 4180-1, Rangeland Health Standards," to ascertain if sage-grouse areas are achieving or making progress toward achieving land health standards. One of the recommended criteria for evaluating this land health standard is the HAF indicators.

Calculating Question 3, Land Use Plan Effectiveness: The amount of habitat disturbance in sage-grouse areas identified in this LUP will be used to determine the LUP's effectiveness in meeting the plan's disturbance objectives. National datasets can be used to calculate the amount of disturbance, but field office data will likely increase the accuracy of this estimate. This information will be used to answer Question 3 of the Land Use Plan Effectiveness Report.

Calculating Question 4, Land Use Plan Effectiveness: The change in estimated sage-grouse populations will be calculated from data provided by the state wildlife agencies, when available, and will be used to determine LUP effectiveness. This population data (see Section B.5.1.2.3, "Population (Demographics) Monitoring" (p. 1823)) will be used to answer Question 4 of the Land Use Plan Effectiveness Report.

Results of the effectiveness monitoring process for the LUP will be used to inform the need for finer-scale investigations, initiate adaptive management actions as described in the Buffalo land use plan, initiate causation determination, and/or determine if changes to management decisions are warranted. The measures used at the broad and mid scales will provide a suite of characteristics for evaluating the effectiveness of the adaptive management strategy.

B.5.1.3. Fine and Site Scales

Fine-scale (third-order) habitat selected by sage-grouse is described as the physical and geographic area within home ranges during breeding, summer, and winter periods. At this level, habitat suitability monitoring should address factors that affect sage-grouse use of, and movements between, seasonal use areas. The habitat monitoring at the fine and site scale (fourth order) should focus on indicators to describe seasonal home ranges for sage-grouse associated with a lek or lek group within a population or subpopulation area. Fine- and site-scale monitoring will inform LUP effectiveness monitoring (see Section B.5.1.2.4, "Effectiveness Monitoring" (p. 1824)) and the hard and soft triggers identified in the LUP's adaptive management section.

The BLM and USFS will coordinate with the State of Wyoming to share conservation, disturbance and vegetation analysis data to provide a core by core evaluation to make necessary adjustments in activity, priorities and other actions.

Site-scale habitat selected by sage-grouse is described as the more detailed vegetation characteristics of seasonal habitats. Habitat suitability characteristics include canopy cover and height of sagebrush and the associated understory vegetation. They also include vegetation

associated with riparian areas, wet meadows, and other mesic habitats adjacent to sagebrush that may support sage-grouse habitat needs during different stages in their annual cycle.

As described in the Conclusion (see Section B.5.1.4, "Conclusion" (p. 1830)), details and application of monitoring at the fine and site scales will be described in the implementation-level monitoring plan for the Buffalo land use plan. The need for fine- and site-scale-specific habitat monitoring will vary by area, depending on proposed projects, existing conditions, habitat variability, threats, and land health. Examples of fine- and site-scale monitoring include: habitat vegetation monitoring to assess current habitat conditions; monitoring and evaluation of the success of projects targeting sage-grouse habitat enhancement and/or restoration; and habitat disturbance monitoring to provide localized disturbance measures to inform proposed project review and potential mitigation for project impacts. Monitoring plans should incorporate the principles outlined in the BLM's AIM strategy (Toevs et al. 2011) and in "AIM-Monitoring: A Component of the Assessment, Inventory, and Monitoring Strategy" (Taylor et al. 2014). Approved monitoring methods are:

- "BLM Core Terrestrial Indicators and Methods" (MacKinnon et al. 2011);
- The BLM's Technical Reference "Interpreting Indicators of Rangeland Health" (Pellant et al. 2005); and,
- "Sage-Grouse Habitat Assessment Framework: Multiscale Assessment Tool" (Stiver et al *in press*).

Other state-specific disturbance tracking models include: the BLM's Wyoming Density and Disturbance Calculation Tool (http://ddct.wygisc.org/) and the BLM's White River Data Management System in development with the USGS. Population monitoring data (in cooperation with state wildlife agencies) should be included during evaluation of the effectiveness of actions taken at the fine and site scales.

Fine- and site-scale sage-grouse habitat suitability indicators for seasonal habitats are identified in the HAF. The HAF has incorporated the Connelly et al. (2000) sage-grouse guidelines as well as many of the core indicators in the AIM strategy (Toevs et al. 2011). There may be a need to develop adjustments to height and cover or other site suitability values described in the HAF; any such adjustments should be ecologically defensible. To foster consistency, however, adjustments to site suitability values at the local scale should be avoided unless there is strong, scientific justification for making those adjustments. That justification should be provided. WAFWA MZ adjustments must be supported by regional plant productivity and habitat data for the floristic province. If adjustments are made to the site-scale indicators, they must be made using data from the appropriate seasonal habitat designation (breeding/nesting, brood-rearing, winter) collected from sage-grouse studies found in the relevant area and peer-reviewed by the appropriate wildlife management agency(ies) and researchers.

When conducting land heath assessments, the BLM should follow, at a minimum, "Interpreting Indicators of Rangeland Health" (Pellant et. al. 2005) and the "BLM Core Terrestrial Indicators and Methods" (MacKinnon et al. 2011). For assessments being conducted in sage-grouse designated management areas, the BLM should collect additional data to inform the HAF indicators that have not been collected using the above methods. Implementation of the principles outlined in the AIM strategy will allow the data to be used to generate unbiased estimates of condition across the area of interest; facilitate consistent data collection and rollup analysis among management units; help provide consistent data to inform the classification and interpretation of imagery; and provide condition and trend of the indicators describing sagebrush characteristics important to sage-grouse habitat (see Section B.5.1.2.4, "Effectiveness Monitoring" (p. 1824)).

B.5.1.4. Conclusion

This Greater Sage-Grouse Monitoring Framework was developed for all of the Final Environmental Impact Statements involved in the sage-grouse planning effort. As such, it describes the monitoring activities at the broad and mid scales and provides a guide for the BLM to collaborate with partners/other agencies to develop the Buffalo land use plan-specific monitoring plan.

B.5.1.5. The BLM Greater Sage-Grouse Disturbance and Monitoring Subteam Membership

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Tim Love (USFS)
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B.5.1.7. Attachments

ATTACHMENT A: AN OVERVIEW OF MONITORING COMMITMENTS

Table B.9. Monitoring Commitments Overview

	Broad and Mid-Scales					Fine & Site Scales
	Implementation	Sagebrush Availability	Habitat Degradation	Population	Effectiveness	
How will the data be used?	Tracking and documenting implementation of land use plan decisions and inform adaptive management	Tracking changes in land cover (sagebrush) and inform adaptive management	Tracking changes in disturbance (threats) to sage-grouse habitat and inform adaptive management	Tracking trends in sage-grouse populations (and/or leks; as determined by state wildlife agencies) and inform adaptive management	Characterizing the relationship among disturbance, implementation actions, and sagebrush metrics and inform adaptive management	Measuring seasonal habitat, connectivity at the fine scale, and habitat conditions at the site scale, calculating disturbance and inform adaptive management
Who is collecting the data?	BLM FO and USFS Forest	NOC and NIFC	National data sets (NOC), BLM FOs and USFS Forests as applicable	State wildlife agencies through WAFWA	Comes from other broad and mid-scale monitoring types, analyzed by the NOC	BLM FO and SO, USFS Forests and RO (with partners) including disturbance
How often are the data collected, reported and made available to USFWS?	Collected and reported annually; summary every 5 years	Updated and changes reported annually; summary reports every 5 years	Collected and changes reported annually; summary reports every 5 years	State data reported annually per WAFWA MOU; summary reports every 5 years	Collected and reported every 5 years (coincident with LUP evaluations)	Collection and trend analysis ongoing, reported every 5 years or as needed to inform adaptive management
What is the spatial scale?	Summarized by LUP with flexibility for reporting by other units	Summarized by PACs (size dependent) with flexibility for reporting by other units	Summarized by PACs (size dependent) with flexibility for reporting by other units	Summarized by PACs (size dependent) with flexibility for reporting by other units	Summarized by MZ, and LUP with flexibility for reporting by other units (e.g., PAC)	Variable (e.g., projects and seasonal habitats)
What are the potential personnel and budget impacts?	Additional capacity or re-prioritization of ongoing monitoring work and budget realignment	At a minimum, current skills and capacity must be maintained; data mgmt cost are TBD	At a minimum, current skills and capacity must be maintained; data mgmt and data layer purchase cost are TBD	No additional personnel or budget impacts for BLM or USFS	Additional capacity or re-prioritization of ongoing monitoring work and budget realignment	Additional capacity or re-prioritization of ongoing monitoring work and budget realignment

	Broad and Mid-Scales					Fine & Site Scales
	Implementation	**Sagebrush Availability**	**Habitat Degradation**	**Population**	**Effectiveness**	
Who has primary and secondary responsibilities for reporting?	1. BLM FO & SO; USFS Forest & RO 2. BLM & USFS Planning	1. NOC 2. WO	1. NOC 2. BLM SO, USFS RO & appropriate programs	1. WAFWA & state wildlife agencies 2. BLM SO, USFS RO, NOC	1. Broad and mid-scale at the NOC, LUP at BLM SO, USFS RO	1. BLM FO & USFS Forests 2. BLM SO & USFS RO
What new processes/ tools are needed?	National implementation data sets and analysis tools	Updates to national land cover data	Data standards and roll-up methods for these data	Standards in population monitoring (WAFWA)	Reporting methodologies	Data standards data storage; and reporting

BLM Bureau of Land Management
FO Field Office
LUP Land Use Plan
MOU Memorandum of Understanding
MZ Management Zone
NIFC National Interagency Fire Center
NOC National Operations Center
PAC Priority Area of Concentration
RO Regional Office
SO State Office
TBD To Be Determined
USFS U.S. Forest Service
USFWS U.S. Fish and Wildlife Service
WAFWA Western Association of Fish and Wildlife Agencies

ATTACHMENT B: LIST OF ALL SAGEBRUSH SPECIES AND SUBSPECIES INCLUDED IN THE SELECTION CRITERIA FOR BUILDING THE EVT AND BpS LAYERS

- *Artemisia arbuscula* subspecies *longicaulis*
- *Artemisia arbuscula* subspecies *longiloba*
- *Artemisia bigelovii*
- *Artemisia nova*
- *Artemisia papposa*
- *Artemisia pygmaea*
- *Artemisia rigida*
- *Artemisia spinescens*
- *Artemisia tripartita* subspecies *rupicola*
- *Artemisia tripartita* subspecies *tripartita*
- *Tanacetum nuttallii*
- *Artemisia cana* subspecies *bolanderi*
- *Artemisia cana* subspecies *cana*
- *Artemisia cana* subspecies *viscidula*
- *Artemisia tridentata* subspecies *wyomingensis*
- *Artemisia tridentata* subspecies *tridentata*
- *Artemisia tridentata* subspecies *vaseyana*
- *Artemisia tridentata* subspecies *spiciformis*
- *Artemisia tridentata* subspecies *xericensis*

- *Artemisia tridentata* variety *pauciflora*
- *Artemisia frigida*
- *Artemisia pedatifida*

ATTACHMENT C: USER AND PRODUCER ACCURACIES FOR AGGREGATED ECOLOGICAL SYSTEMS WITHIN LANDFIRE MAP ZONES

Table B.10. User and Producer Accuracies for Aggregated Ecological Systems within LANDFIRE Map Zones

LANDFIRE Map Zone Name	User Accuracy	Producer Accuracy	Percent of Map Zone within Historic Schroeder
Wyoming Basin	76.9%	90.9%	98.5%
Snake River Plain	68.8%	85.2%	98.4%
Missouri River Plateau	57.7%	100.0%	91.3%
Grand Coulee Basin of the Columbia Plateau	80.0%	80.0%	89.3%
Wyoming Highlands	75.3%	85.9%	88.1%
Western Great Basin	69.3%	75.4%	72.9%
Blue Mountain Region of the Columbia Plateau	85.7%	88.7%	72.7%
Eastern Great Basin	62.7%	80.0%	62.8%
Northwestern Great Plains	76.5%	92.9%	46.3%
Northern Rocky Mountains	72.5%	89.2%	42.5%
Utah High Plateaus	81.8%	78.3%	41.5%
Colorado Plateau	65.3%	76.2%	28.8%
Middle Rocky Mountains	78.6%	73.3%	26.4%
Cascade Mountain Range	57.1%	88.9%	17.3%
Sierra Nevada Mountain Range	0.0%	0.0%	12.3%
Northwestern Rocky Mountains	66.7%	60.0%	7.3%
Southern Rocky Mountains	58.6%	56.7%	7.0%
Northern Cascades	75.0%	75.0%	2.6%
Mogollon Rim	66.7%	100.0%	1.7%
Death Valley Basin	0.0%	0.0%	1.2%

Note: There are two anomalous map zones with 0% user and producer accuracies, attributable to no available reference data for the ecological systems of interest.
Note: User accuracy is a map-based accuracy that is computed by looking at the reference data for a class and determining the percentage of correct predictions for these samples. For example, if one selects any sagebrush pixel on the classified map, what is the probability that one will be standing in a sagebrush stand when one visits that pixel location in the field? Commission Error equates to including a pixel in a class when it should have been excluded (i.e., commission error = 1 – user's accuracy).
Note: Producer accuracy is a reference-based accuracy that is computed by looking at the predictions produced for a class and determining the percentage of correct predictions. In other words, if one knows that a particular area is sagebrush, what is the probability that the digital map will correctly identify that pixel as sagebrush? Omission Error equates to excluding a pixel that should have been included in the class (i.e., omission error = 1 – producer's accuracy).

% percent

B.6. COT Objective 6: Prioritize, Fund and Implement Research to Address Existing Uncertainties

> Increased funding and support for key research projects that will address uncertainties associated with sage-grouse and sagebrush habitat management is essential. Effective amelioration of threats can only be accomplished if the mechanisms by which those threats are imposed on the redundancy, representation, and resilience of the species and its habitats are understood." (COT Report, 2013)

In accordance with BLM policy, the Record of Decision and Approved Plan will establish intervals and standards for evaluations as part of the implementation strategy. Priorities will be established based on the identified threats in the planning area, the conservation objectives included as part of the Approved Plan, and any potential uncertainties associated with sage-grouse and associated habitat management. A part of this strategy will include development of a budget to accomplish each of the identified tasks and fund potential research topics to address any uncertainties.

As new science pertaining to sage-grouse and habitat is continuously evolving, refined management strategies may be necessary to ensure that BLM and USFS are utilizing the most current science, information, and data regarding sage-grouse. It is for this reason that BLM and USFS have collaborated with the State of Wyoming and USFWS to develop an adaptive management strategy as a part of the planning process.

B.6.1. Wyoming Greater Sage-Grouse Adaptive Management Plan

The Greater Sage-Grouse adaptive management plan provides a means of addressing and responding to negative impacts to Greater Sage-Grouse and it's habitat before consequences become severe or irreversible. This adaptive management plan:

- utilizes science based soft and hard adaptive management triggers,
- addresses multiple scales of data, and
- utilizes an adaptive management working group.

B.6.1.1. Adaptive Management Triggers

Adaptive management triggers are essential for identifying when potential management changes are needed in order to continue meeting Greater Sage-Grouse conservation objectives. With respect to sage-grouse, all regulatory entities in Wyoming, including the BLM and FS, use soft and hard triggers. Soft and hard triggers are focused on three metrics: (1) number of active leks, (2) acres of available habitat, and (3) population trends based on annual lek counts.

Soft Triggers:

Soft triggers are indicators that management or specific activities may not be achieving the intended results of conservation action or that unanticipated changes to populations or habitats have occurred that have the potential to place habitats or populations at risk. The soft trigger is any deviation from normal trends in habitat or population in any given year. Metrics include, but are not limited to, annual lek counts, wing counts, aerial surveys, habitat monitoring, and DDCT evaluations. BLM and/or FS field offices, with the assistance of their respective land and resource management plan implementation groups, local WGFD offices, and local sage-grouse working

groups will evaluate the metrics with the Adaptive Management Working Group (AMWG) on an annual basis. The purpose of these strategies is to address localized Greater Sage-Grouse population and habitat changes by providing the framework in which management will change if monitoring identifies negative population and habitat anomalies in order to avoid crossing a hard trigger threshold.

Hard Triggers:

Hard triggers are indicators that management is not achieving desired conservation results. Hard triggers would be considered an indicator that the species is not responding to conservation actions, or that a larger-scale impact or set of impacts is having a negative effect.

Within the range of normal population variables, hard triggers shall be determined to take effect when two of the three metrics exceeds 60 percent of normal variability for the area under management in a single year, or when any of the three metrics exceeds 40 percent of normal variability for a three year time period within a five-year range of analysis. A minimum of three consecutive years in a five-year period is used to determine trends (i.e., Y1-2-3, Y2-3-4, Y3-4-5).

B.6.1.2. Adaptive Management Response

Soft Triggers Response:

Soft triggers require immediate monitoring and surveillance to determine causal factors and may require curtailment of activities in the short- or long-term, as allowed by law. The project level adaptive management strategies will identify appropriate responses where the project's activities are identified as the causal factor. The management agency (BLM and/or FS) and the AMWG will implement an appropriate response strategy to address causal factors not attributable to a specific project or to make adjustments at a larger regional or state-wide level.

Hard Trigger Response:

Upon determination that a hard trigger has been tripped, the BLM and/or FS will immediately defer issuance of discretionary authorizations for new actions for a period of 90 days. In addition, within 14 days of a determination that a hard trigger has been tripped, the AMWG will convene to develop an interim response strategy and initiate an assessment to determine the causal factor or factors (hereafter called the causal factor assessment).

Interim Strategy

An interim response strategy will be developed, and implemented to the extent permitted by law, within 90 days of determination that a hard trigger has been tripped. The technical team (see Implementation Groups below) will be consulted to identify the scope and scale of the interim strategy. Based on the recommendation of the AMWG, the BLM and/or FS will implement an interim response strategy through an Instruction Memorandum or other management mechanisms to direct management until the causal factor(s) and appropriate response(s) can be determined. The interim response strategy will consist of appropriate management measures undertaken at the project stage, supported by the best available science, to address the specific metric which has been tripped and may include deferral of some activities as appropriate. Measures that were analyzed in this EIS and the COT, NTT reports, and NPT guidance will be reviewed in addition to current science to identify the most appropriate measures to be implemented as part of the interim response strategy. The BLM and/or FS will comply with all applicable law in implementing

such response(s), and, if applicable, will undertake a plan amendment or revision under BLM and/or FS's planning regulations and policies.

The interim strategy will be implemented for the biologically significant unit (BSU), which, in Wyoming, is the Core Area, regardless of whether the Core Area crosses multiple planning boundaries. If it has been identified that more than one Core Area has the same hard triggers being tripped, or is trending towards triggers being tripped, the interim strategy will be implemented at the appropriate scale.

Causal Factor Assessment

The causal factor assessment will be completed within 180 days of determination that a hard trigger threshold has been crossed. Once the causal factor assessment is completed by the AMWG, the interim response strategy will be modified to adequately address the causal factors in consultation with the technical team. If a causal factor or factors cannot be identified, the interim response strategy shall stay in place until the cause can be determined and any new planning decision can be implemented.

B.6.1.3. EIS Level Projects

Each major project (EIS level) will include adaptive management strategies in support of the population management objectives for Greater Sage-Grouse set by the State of Wyoming, and will be consistent with the Wyoming Greater Sage-Grouse Adaptive Management Plan. These adaptive management strategies will be developed in partnership with the AMWG, WGFD, project proponents, partners, and stakeholders, incorporating the best available science.

In making amendments to this plan, the BLM will coordinate with the FWS as BLM continues to meet its objective of conserving, enhancing and restoring GRSG habitat by reducing, minimizing or eliminating threats to that habitat.

B.6.1.4. Implementation Groups

Sage-Grouse Implementation Team

The State of Wyoming's strategy is implemented by the SGIT, established by Executive Order in 2008 and codified in 2014 by the Wyoming Legislature (W.S. § 9-19-101). The SGIT is a Governor appointed body with representation by federal agencies (BLM, USFS, USFWS, NRCS), state agencies (Wyoming Game and Fish Commission, Department of Agriculture, Department of Environmental Quality, Wildlife and Natural Resource Trust Fund, Oil and Gas Conservation Commission, and Office of State Lands and Investments), the Wyoming Legislature, county governments, energy developers, mining companies, landowners, and non- governmental organizations. The BLM, USFWS, NRCS, and the USFS all have an equal role in the SGIT.

Land and Resource Management Plan – Implementation Teams

Land and Resource Management Plans are implemented through implementation teams. These implementation teams include cooperating agencies who participated in the development of this land use plan representing local, state, and federal agencies. These implementation teams will coordinate with the AMWG and others to evaluate metrics and management responses necessary to meet Greater Sage-Grouse conservation objectives within their planning area.

Adaptive Management Working Group and Technical Team

An AMWG will be established in consultation with the SGIT to provide appropriate guidance for agencies with the ability to affect sage-grouse populations and/or habitat through their permitting authority. The AMWG will include BLM, USFS, USFWS, and State of Wyoming. The purpose of this group will be to initiate a response strategy should it be determined that a hard trigger has been tripped or if soft triggers are showing a trend across a region. A hard trigger may be tripped at any time, thus, upon identification of such event, current available population and habitat data will be reviewed by the AMWG with the assistance of a technical team comprised of agency biologists, scientists familiar with the Management Zone in question, and other individuals as appropriate (e.g., habitat managers, respective landowners, other appropriate representatives) to confirm that a hard trigger has been tripped. Upon verification of data showing that a hard trigger has been tripped, the AMWG will convene within 14 days.

The AMWG will review monitoring data which has been collected by the appropriate local sage-grouse working groups in conformance with data collection standards. This group will meet annually to review all data collected in the prior year regarding Greater sage-grouse populations and habitats. Monitoring data will have been analyzed (by WGFD for population based metrics (leks, wing counts, etc. and by land managers [BLM, USFS, State of Wyoming] for habitat based metrics [DDCT, etc.]) Should the monitoring data suggest a trend toward a soft or hard trigger being tripped, they will 1. Identify what metric is indicating that trend (population or habitat); and 2. Identify a technical team to review the data and compile a range of activities which may be causing the trend. Should review of the monitoring data identify that multiple soft triggers have been tripped in one Core Area, or the same triggers have been tripped across multiple Core Areas, the technical team will be tasked with verifying the scope and intensity of the trends.

Once the analysis of the trends has been completed by the technical team and reported back to the AMWG, the AMWG will make recommendations to the appropriate land managing agency regarding an interim adaptive management strategy to be implemented. Implementation will occur via the appropriate regulations and policy applicable for that agency. At that time, the State of Wyoming will conduct a review of the regulatory authority implementing the Sage Grouse Core Area Strategy to determine if a State of Wyoming adaptive management strategy is warranted.

Upon review of the annual data by the AMWG and technical team, the State of Wyoming, as part of the AMWG, will contact neighboring states within the respective Management Zone to inform them of any findings. Should a hard trigger be tripped, the trigger which has been tripped and any recommended adaptive management strategy being implemented will be shared with the appropriate neighboring state(s). Should the need arise for implementation of a multi-state adaptive management strategy; the AMWG will coordinate to develop an effective response.

B.6.1.5. Small Leks

Small leks will be given special consideration. Due to geographic variations a definition of "small" is not provided, rather determination of "small" will be made by the AMWG based upon recommendations of the scientific community. Generally, "small" is considered 10 or fewer males for a three year time period within a five-year range of analysis. If a trigger is hit based upon such a lek, then the adaptive management working group will evaluate the site-specific circumstances and determine appropriate remedial action.

Glossary Terms

Additionality:
The conservation benefits of compensatory mitigation are demonstrably new and would not have resulted without the compensatory mitigation project. (BLM Manual Section 1794).

Avoidance mitigation:
Avoiding the impact altogether by not taking a certain action or parts of an action (40 CFR 1508.20(a)) (e.g., may also include avoiding the impact by moving the proposed action to a different time or location).

Compensatory mitigation:
The restoration, creation, enhancement, and/or preservation of impacted resources (adopted and modified from 33 CFR 332), such as on-the-ground actions to improve and/or protect habitats (e.g., chemical vegetation treatments, land acquisitions, conservation easements.

Compensatory mitigation projects:
Specific, on-the-ground actions to improve and/or protect habitats (e.g., chemical vegetation treatments, land acquisitions, conservation easements).

Compensatory mitigation sites:
The durable areas where compensatory mitigation projects will occur.

Durability (protective and ecological):
The maintenance of the effectiveness of a mitigation site and project for the duration of the associated impacts, which includes resource, administrative/legal, and financial considerations.

Minimization mitigation:
Minimizing impacts by limiting the degree or magnitude of the action and its implementation (40 CFR 1508.20 (b)).

Residual impacts:
Impacts from an authorized land use that remain after applying avoidance and minimization mitigation; also referred to as unavoidable impacts.

Timeliness:
The lack of a time lag between impacts and the achievement of compensatory mitigation goals and objectives (BLM Manual Section 1794).

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Appendix C. Public Involvement, Consultation, and Coordination

C.1. Introduction

Public involvement, consultation, and coordination initiated prior to and occurred throughout preparation of the Buffalo Resource Management Plan (RMP) revision and associated Environmental Impact Statement (EIS). The Bureau of Land Management (BLM) incorporated public involvement, consultation, and coordination through public meetings, informal meetings, individual contacts, news releases, planning bulletins, workshops, a planning website, and the Federal Register. This appendix describes the public involvement process, as well as other key consultation and coordination activities undertaken to prepare the EIS in support of the RMP revision.

The BLM decision-making process is conducted in accordance with the requirements of the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations implementing NEPA, and the United States (U.S.) Department of the Interior (DOI) and BLM policies and procedures implementing NEPA. NEPA and the associated regulatory and policy framework require that all federal agencies involve the interested public and potentially affected parties in their decision-making, consider reasonable alternatives to proposed actions, and prepare environmental documents that disclose the potential impacts of proposed actions and alternatives.

A Notice of Intent (NOI) published in the Federal Register on November 14, 2008, formally announced the BLM's intent to revise the existing plans and prepare the associated EIS. The NOI initiated the scoping process and invited participation of affected and interested agencies, organizations, and members of the public in determining the scope and issues to be addressed by alternatives and analyzed in the EIS. The BLM solicited additional public involvement, including cooperating agency meetings and workshops, to help identify issues to be addressed in developing a full range of land management alternatives. Following release of the Draft RMP and EIS on June 28, 2013, the BLM hosted four public meetings in August 2013 to respond to questions and solicit comments on the Draft RMP and EIS. Table C.1, "Public Involvement, Coordination, and Consultation Events" (p. 1843) lists public involvement, coordination, and consultation events.

Table C.1. Public Involvement, Coordination, and Consultation Events

Date	Location	Event
December 1, 2008	Wright, Wyoming	Public Scoping Meeting
December 2, 2008	Buffalo, Wyoming	Public Scoping Meeting
December 3, 2008	Gillette, Wyoming	Public Scoping Meeting
December 4, 2008	Sheridan, Wyoming	Public Scoping Meeting
December 5, 2008	Kaycee, Wyoming	Public Scoping Meeting
October 22, 2008	Buffalo, Wyoming	Socioeconomic Workshop
October 22-23, 2008	Buffalo, Wyoming	Cooperating Agency Training
May 20 – 22, 2009	Buffalo, Wyoming	Goals and Objectives Development Workshop
June 17 – 18, 2009	Buffalo, Wyoming	Range of Alternatives Development Workshop
July 15 – 16, 2009	Buffalo, Wyoming	Range of Alternatives Development Workshop

Date	Location	Event
August 19 – 20, 2009	Buffalo, Wyoming	Range of Alternatives Development Workshop
September 16 – 17, 2009	Buffalo, Wyoming	Range of Alternatives Development Workshop
October 7 – 8, 2009	Buffalo, Wyoming	Range of Alternatives Development Workshop
December 14, 2009	Buffalo, Wyoming	Open House
December 15, 2009	Gillette, Wyoming	Open House
April 27 – 29, 2010	Buffalo, Wyoming	Preferred Alternative Development Workshop
August 5, 2013	Buffalo, Wyoming	Open House
August 6, 2013	Gillette, Wyoming	Open House
August 19, 2013	Sheridan, Wyoming	Open House
August 20, 2013	Kaycee, Wyoming	Open House

C.2. Public Involvement

In accordance with CEQ scoping guidance, the BLM provided opportunities 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. The scoping report, which summarizes public participation during scoping and issues identified during the scoping process, is available on the Buffalo RMP website at http://www.blm.gov/wy/st/en/programs/Planning/rmps/buffalo.html.

The intent of the scoping process is to provide an opportunity for the public, tribes, other government agencies, and interest groups to learn about the project and provide input on the planning issues, impacts, and potential alternatives that will be addressed in the EIS, and the extent to which those issues will be analyzed. In general, public involvement during scoping assists the agency through the following:

- Broadening the information base for decision-making.
- Informing the public about the EIS and proposed RMP and the potential impacts associated with various management decisions.
- Ensuring public needs and viewpoints are brought to the attention of the agency.
- Determining the scope and the significant issues to be analyzed in depth in the EIS.

Scoping Period

The scoping process for the Buffalo RMP revision began with the publication of the NOI in the Federal Register on November 14, 2008 and went through January 5, 2009. The scoping period provides an opportunity for the public to identify potential planning issues and concerns associated with the RMP and EIS. Information obtained by the BLM during scoping is combined with issues identified by the agencies to form the scope of the EIS.

Public Notification of Scoping

News Release

The BLM issued a news release to local media on August 13, 2008 announcing plans to revise the Buffalo RMP. On November 10, 2008, the BLM issued a news release describing the

public scoping period and listing the time, date, and location of the public scoping meetings. The news releases went out to numerous radio stations and newspapers within and outside of the planning area.

Planning Bulletin
Another means of outreach prior to the public scoping meetings included a bulletin announcing the scoping meetings. This bulletin included general information about the planning process and planning area for the RMP; contact information and comment submission instructions; and a list of the dates, times, and locations of the public scoping meetings. The BLM mailed the bulletin to potentially interested individuals and organizations who had participated in past BLM projects.

Website
The website provides background information on the project, a description of the scoping process and meeting locations, instructions on how to submit comments, a general overview of potential planning topics, and copies of public information documents such as the NOI and the existing plan. The website is one of the methods used to communicate project news and updates to the public. The website may be accessed at: http://www.blm.gov/wy/st/en/programs/Planning/rmps/buffalo.html.

Scoping Meetings

During the week of December 1, 2008, the BLM hosted scoping meetings in five locations across the planning area. All meetings ran from 3:00 p.m. until 8:00 p.m. Table C.1, "Public Involvement, Coordination, and Consultation Events" (p. 1843) lists the scoping meeting locations and dates. The five public scoping meetings provided the public with an opportunity to learn and ask questions about the project and the planning process and to submit their issues and concerns to the BLM. The BLM gave two formal presentations, one at 3:30 p.m. and one at 6:00 p.m., each of which was followed by an open house format discussion between the BLM and meeting attendees. The formal presentations were designed to provide participants a good foundation in the RMP revision process, how to provide effective comments, and some of the resource issues to be covered in the RMP revision. Each formal presentation also included a question and answer session. The open house portions of the meetings were designed to allow attendees to learn about the project at their own pace and to enable them to ask BLM representatives questions in an informal one-on-one setting.

In addition to members of the BLM interdisciplinary team, a total of 129 people attended the scoping meetings. The BLM provided four handouts and displayed a series of four 3-panel table top boards at each scoping meeting.

The BLM encouraged meeting attendees to comment by submitting written comment forms (either at the meetings or via mail), or by sending an email. Comment forms were available to attendees at all meetings, as was a computer kiosk where the public could type and submit their comments. The BLM also provided an easel with a pad of paper for meeting attendees to write comments on.

Open Houses/Public Meetings

The BLM held two open house meetings in December 2009 in Buffalo and Gillette, Wyoming. Similar to the public scoping meetings, the open house meetings provided the public an opportunity to ask questions of BLM staff and learn about the progress of the project. Several

BLM specialists and other representatives of the BLM were in attendance to provide information and address questions and concerns.

Mailing List
The BLM compiled a list of 1,217 individuals, agencies, and organizations that participated in past BLM projects or requested to be on the general mailing list. The BLM mailed the initial planning bulletin to each individual on this list. Visitors to the scoping meetings were asked to sign in and provide their mailing address so that they could also be added to the mailing list. Other additions to the mailing list include those individuals who have submitted requests to be added to the list. Duplicate entries, changes of address, and return-to-sender mailings were deleted from the official project mailing list as identified. Through this process, the general mailing list was revised to approximately 1,500 entries. Requests to be added to or to remain on the official mailing list will continue to be accepted throughout the planning process.

Planning Bulletins
Periodic planning bulletins have been and are being developed and distributed to keep the public informed of the Buffalo RMP revision. Eight planning bulletins have been emailed and mailed to individuals on the Buffalo RMP mailing. The planning bulletins have also been made available for download on the Buffalo RMP revision website.

Website
The Buffalo RMP revision website can be found at: http://www.blm.gov/wy/st/en/programs/Planning/rmps/buffalo.html. The site provides individuals with RMP news and information and access to documents related to the revision. The website serves as a virtual repository for documents related to the development of the RMP, including announcements, planning bulletins, and documents. The documents are available in PDF format to ensure they are accessible to the widest range of interested parties. The website provides the public an opportunity to submit their comments for consideration as part of the planning process and to be added to the project mailing list.

Public Comment Period on the Draft RMP and EIS

A Notice of Availability announcing release of the Draft RMP and EIS was published in the Federal Register on June 28, 2013, initiating the 90-day public comment period. The public comment period closed on September 26, 2013. During the public comment period, the public was provided the opportunity to review and comment on the Draft RMP and EIS.

Notification
The BLM issued a press release on July 19, 2013 announcing the dates, times, and locations of the public meetings. The BLM also distributed a newsletter via U.S. mail and email to individuals on the BLM mailing list, which provided dates and locations of the public meetings. In addition to news releases and other notifications from the BLM regarding the comment period, some members of the public received notification from other sources. Several articles and news bulletins regarding the release of the Draft RMP and EIS were published in local newspapers. Many of the articles listed the dates for the public meetings.

Public Meetings
During the public comment period, the BLM hosted four public meetings in August 2013 in towns and cities throughout the planning area (see Table C.1, "Public Involvement, Coordination, and Consultation Events" (p. 1843) for meeting dates and locations). The public meetings provided

the opportunity for the public to ask questions and submit comments. The meetings were held in an open house format with a formal presentation provided by BLM managers. BLM managers, resource specialists and other representatives of the BLM were present during these meetings to discuss the RMP and answer questions.

Comment Analysis
Based on comments received during this period, the BLM revised the RMP where appropriate. Changes made to the Draft RMP and EIS based on comments are reflected in the Proposed RMP and Final EIS. The Comment Analysis Report summarizes all substantive comments received during the 90-day public comment period and the BLM responses to those comments, including how the document was revised based on comments. The report is presented in Appendix Y (p. 2671).

Future Public Involvement

Public participation efforts will be ongoing throughout the remainder of the process of revising the RMP and developing the EIS. The Proposed RMP and Final EIS considered all substantive oral and written comments received during the 90-day public comment period for the Draft RMP and EIS. Members of the public with standing will have the opportunity to protest the content of the Proposed RMP and Final EIS during the specified 30-day protest period. The Record of Decision will be issued by the BLM following the Governor's Consistency Review and protest resolution.

C.3. 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 EIS. Title II, Section 202 of the Federal Land Policy and Management Act (FLPMA) directs the BLM to coordinate inventory, planning, and management efforts with the land use planning and management programs of Native American Tribes, other federal departments, and agencies of the state and local governments as part of its land use planning process, to the extent consistent with the laws governing the administration of the public lands. The BLM is directed to integrate NEPA requirements with other environmental review and consultation requirements to reduce paperwork and delays (40 Code of Federal Regulations 1500.4-5). The BLM accomplished coordination with other agencies and consistency with other plans through ongoing communications, meetings, and collaborative efforts with the BLM Interdisciplinary Team, which includes BLM specialists, and federal, state, and local agencies.

The BLM is aware that there are specific State laws and local plans relevant to aspects of public land management that are discrete from, and independent of, Federal law. However, BLM is bound by Federal law. As a consequence, there may be inconsistencies that cannot be reconciled. The FLPMA and its implementing regulations require that BLM's land use plans be consistent with State and local plans only if those plans are consistent with the purposes, policies, and programs of federal laws and regulations applicable to public lands. Where State and local plans conflict with the purposes, policies, and programs of Federal law there will be an inconsistency that cannot be resolved. While County and Federal planning processes, under FLPMA, are required to as integrated and consistent as practical, the Federal agency planning process is not bound by or subject to County plans, planning processes, or planning stipulations.

Cooperating Agencies

The BLM invited local, state, federal, and tribal representatives to participate as cooperating agencies on the Buffalo RMP revision and EIS. The BLM invited the following entities to participate because they have jurisdiction by law or because they could offer special expertise:

Counties

- Campbell County Commission
- Crook County Commission
- Johnson County Commission
- Sheridan County Commission

Conservation Districts

- Campbell County Conservation District
- Lake DeSmet Conservation District
- Powder River Conservation District
- Sheridan County Conservation District

Wyoming State Agencies

- Office of the Governor
- Office of State Lands and Investments
- Wyoming Department of Agriculture
- Wyoming Department of Environmental Quality
- Wyoming Department of Revenue
- Wyoming Department of State Parks and Cultural Resources
- Wyoming Department of Transportation
- Wyoming Game and Fish Department
- Wyoming Oil and Gas Conservation Commission
- Wyoming State Engineer's Office
- Wyoming State Forestry Division
- Wyoming State Geological Survey
- Wyoming State Historic Preservation Office
- Wyoming State Planning Office
- Wyoming Trails
- Wyoming Water Development Commission

Federal Agencies

- Bighorn National Forest
- Medicine Bow-Routt National Forest, Thunder Basin National Grasslands
- U.S. DOI – Office of Surface Mining
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. Nuclear Regulatory Commission

Tribes

- Cheyenne River Sioux
- Oglala Lakota Nation
- Rosebud Sioux Tribe
- Ft. Peck Sioux Tribe
- Standing Rock Sioux Tribe
- Lower Brule Sioux Tribe

- Yankton Sioux Tribe
- The Sisseton-Wahpeton Oyate
- Crow Creek Sioux Tribe
- Santee Sioux Tribe of Nebraska
- Northern Cheyenne Tribe
- Northern Arapaho Tribe
- Crow Nation
- Eastern Shoshone Tribe
- Three Affiliated Tribes

The BLM formally invited the cooperating agencies to participate in developing the alternatives and RMP and EIS, and to provide data and other information relative to their agency responsibilities, goals, mandates, and expertise. Cooperating agencies provided input during the initial scoping process. The BLM held general meetings with cooperators to discuss procedures and processes. The BLM and cooperating agencies held several workshops to develop goals and objectives, a range of alternatives, and the Preferred Alternative between May 2009 and April 2010. Cooperating agencies have also provided comments on draft RMP related documents throughout the revision process.

In addition, the following federal Congressional Offices participated in the meetings with cooperating agencies.

- U.S. Senator Michael Enzi's Office
- U.S. Senator John Barrasso's Office
- U.S. Representative Cynthia Lummis' Office

Endangered Species Act Consultation

The Buffalo Field Office (BFO) contacted the U.S. Fish and Wildlife Service (USFWS) regarding Section 7 of the Endangered Species Act and the Buffalo RMP revision. The BLM sent a scoping letter to the USFWS requesting comments concerning Section 7 consultation and the Buffalo RMP revision project. On January 5, 2010 the USFWS provided comments on (1) Threatened and Endangered species, (2) migratory birds, and (3) wetlands and riparian areas. Within these comments the USFWS provided a list of Threatened and Endangered species likely to occur on BLM-administered land in the BFO, for evaluating BLM Section 7 responsibilities. The USFWS was also provided opportunities to comment on the draft RMP and EIS. Consultation letters concerning the Buffalo RMP revision project are located at the end of this appendix. The BFO will continue consultation with the USFWS regarding the RMP revision through completion of the final biological assessment (Appendix I (p. 2025)) and Proposed RMP and Final EIS.

Native American Consultation

Consultation with Native American tribes is part of the National Historic Preservation Act (NHPA) compliance process, the NEPA process and a requirement of FLPMA. The BLM invited numerous Native American tribes to be cooperating agencies as part of the RMP revision. The Northern Cheyenne Tribe accepted the invitation and attended cooperator meetings.

BFO invited Native American tribes to comment on interests or concerns related to management in the planning area and asked tribes to identify any places of traditional religious or cultural importance within the planning area. An example consultation letter between the Native

American tribes and the BLM is located at the end of this appendix. In November of 2010, May of 2011, June of 2011, February of 2012, May of 2012, and June of 2012, the BLM met with representatives from the Standing Rock, Cheyenne River Sioux, Rosebud Sioux, Crow Creek Sioux, Lower Brule Sioux, Oglala Lakota, Sisseton Wahpeton Oyate, Yankton Sioux, Flandreau Santee, Fort Peck, Three Affiliated, Crow, Northern Arapaho, and Northern Cheyenne Tribes to coordinate and discuss the RMP. The Northern Cheyenne Tribe is a cooperating agency for this planning effort and their representatives attended formal cooperators meetings. BFO also travelled to the headquarters of the Northern Cheyenne Tribe in Lame Deer Montana to discuss the RMP with tribal representatives and Northern Cheyenne Cultural Commission in January of 2014. These meetings were not considered government-to-government consultation by either party, but the BLM did take note of several tribal concerns from official tribal representatives and elected officials. The BLM will continue efforts toward government-to-government consultation with all interested tribes after publication of this draft and throughout the remainder of the RMP process.

C.4. Distribution List

The BLM distributed the Proposed RMP and Final EIS to the following entities for their review and comment.

TRIBAL GOVERNMENTS

- Cheyenne River Sioux
- Oglala Lakota Nation
- Rosebud Sioux Tribe
- Ft. Peck Sioux Tribe
- Standing Rock Sioux Tribe
- Lower Brule Sioux Tribe
- Yankton Sioux Tribe
- The Sisseton-Wahpeton Oyate
- Crow Creek Sioux Tribe
- Santee Sioux Tribe of Nebraska
- Northern Cheyenne Tribe
- Northern Arapaho Tribe
- Crow Nation
- Eastern Shoshone Tribe
- Three Affiliated Tribes

LOCAL GOVERNMENTS (COUNTIES, CITIES, TOWNS)

Campbell County, Wyoming

- Campbell County Commission
- Campbell County Conservation District
- City of Gillette
- Town of Wright

Crook County, Wyoming

- Crook County Commission

Johnson County, Wyoming

- Johnson County Commission

- Lake DeSmet Conservation District
- Powder River Conservation District
- City of Buffalo
- Town of Kaycee

Sheridan County, Wyoming

- Sheridan County Commission
- Sheridan Conservation District
- City of Sheridan

WYOMING STATE AGENCIES

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

WYOMING STATE BOARDS/COMMISSIONS

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

WEED AND PEST CONTROL DISTRICTS

- Campbell County Weed and Pest Control District
- Johnson County Weed and Pest Control District
- Sheridan County Weed and Pest Control District

LOCAL GOVERNMENT ASSOCIATIONS/COUNCILS

- Wyoming Association of Municipalities
- Wyoming County Commissioners Association
- Wyoming Association of Conservation Districts

NON–GOVERNMENT ORGANIZATIONS

- Alliance for Historic Wyoming
- Audubon Society
- Audubon Wyoming
- Biodiversity Conservation Alliance
- Coalbed Natural Gas Alliance
- Foundation for North American Wild Sheep
- Independent Petroleum Association of Mountain States
- Izaak Walton League
- National Wildlife Federation
- Natural Resources Defense Council
- Petroleum Association of Wyoming
- Powder River Basin Resource Council
- Public Lands Foundation
- Rocky Mountain Elk Foundation
- Sierra Club
- The Conservation Fund
- The Land Trust Alliance
- The Nature Conservancy
- The Wilderness Society
- The Wildlife Society
- Trout Unlimited
- Western Watersheds Project
- Wildlife Habitat Council
- Wyoming Livestock Roundup
- Wyoming Mining Association
- Wyoming Natural Diversity Database
- Wyoming Nature Conservancy
- Wyoming Outdoor Council
- Wyoming Stockgrowers Association
- Wyoming Wilderness Association
- Wyoming Wildlife Federation
- Wyoming Wildlife Trust Fund
- Wyoming Woolgrowers Association

CONGRESSIONAL DELEGATION

- U.S. Senator Michael Enzi
- U.S. Senator John Barrasso
- U.S. Representative Cynthia Lummis

U.S. DEPARTMENT OF THE INTERIOR

- Bureau of Indian Affairs
- U.S. Bureau of Reclamation
- National Park Service

- Office of Environmental Policy and Compliance
- Natural Resources Library
- Office of Surface Mining
- U.S. Fish and Wildlife Service
- U.S. Geological Survey
  - Washington, D.C.
  - Cheyenne, Wyoming
- Bureau of Land Management
  - Washington, D.C.
  - Wyoming State Office, Cheyenne
  - Wyoming District Offices: Casper, Rock Springs, Worland
  - Wyoming Field Offices: Casper, Cody, Kemmerer, Lander, Newcastle, Pinedale, Rawlins, Rock Springs, and Worland

OTHER FEDERAL AGENCIES

- U.S. Environmental Protection Agency
- U.S. Department of Agriculture Forest Service
  - Bighorn National Forest
  - Medicine Bow-Routt National Forest and Thunder Basin National Grassland
- U.S. Department of Agriculture Natural Resources Conservation Service
- U.S. Army Corps of Engineers
- Department of Energy Western Area Power Administration
- Federal Highway Administration
- Federal Energy Regulatory Commission
- U.S. Government Printing Office
- National Oceanic and Atmospheric Administration National Weather Service

LIBRARIES

- Library of Congress
- University of Wyoming Library
- Campbell County Library
- Johnson County Library
- Sheridan County Public Library

EDUCATIONAL INSTITUTIONS

- University of Wyoming
- Wyoming Community College Commission
- Northern Wyoming Community College District
  - Buffalo Campus
  - Gillette Campus
  - Sheridan Campus

NEWSPAPERS

- Buffalo Bulletin, Buffalo, Wyoming
- Billings Gazette, Billings, Montana
- Casper Star Tribune, Casper, Wyoming
- Casper Journal, Casper, Wyoming
- Douglas Budget, Douglas, Wyoming
- Gillette News-Record, Gillette, Wyoming

- Glenrock Independent, Glenrock, Wyoming
- Guernsey Gazette, Guernsey, Wyoming
- High Plains Sentinel, Wright, Wyoming
- Kaycee Community Voice, Kaycee, Wyoming
- Lingle Guide, Lingle, Wyoming
- Lusk Herald, Lusk, Wyoming
- Moorcroft Leader, Moorcroft, Wyoming
- Newcastle Newsletter Journal, Newcastle, Wyoming
- Our Town, Casper, Wyoming
- Platte County Record Times, Wheatland, Wyoming
- Sheridan Press, Sheridan, Wyoming
- Sundance Times, Sundance, Wyoming
- Torrington Telegram, Torrington, Wyoming
- Weston County Gazette, Upton, Wyoming
- Wyoming Associated Press
- Wyoming Business Report
- Wyoming Livestock Roundup

RADIO

- KLGT-FM/KBBS-AM, Buffalo
- KTWO-AM/KMGW-FM/KWYY-FM, Casper
- KRVK-FM/KKTL-AM/KTRS-FM, Casper
- KASS/KQLT/K MLD/KHOC/KVOC/KERM-KGOS, Casper
- KKTY-AM, Douglas
- KYOD- FM, Douglas
- KIML-AM/KAML-FM, Gillette
- KGOS-AM/KERM-FM, Torrington
- KASL-AM, Newcastle
- KWYO-AM/KROE-AM/KZWY-FM/KYTI-FM, Sheridan
- KBFS-AM/KYDT-FM, Sundance
- KYCN-AM/KZEW-FM, Wheatland
- Northern Broadcasting System, Montana
- Wyoming Public Radio, Laramie
- Wyoming Outdoor Radio

C.5. Consultation Letters

Section 7 Consultation Letter

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
5353 Yellowstone Road, Suite 308A
Cheyenne, Wyoming 82009

In Reply Refer To:
ES-61411/W.02/WY09FA0031

JAN 05 2009

Memorandum

To: Field Manager, Bureau of Land Management, Buffalo Field Office; Buffalo, Wyoming

From: Field Supervisor, U.S. Fish and Wildlife Service, Wyoming Field Office, Cheyenne, Wyoming Scott Hicks

Subject: Scoping Comments for Buffalo Resource Management Plan

Thank you for the opportunity to provide scoping comments on the proposed Buffalo Resource Management Plan (RMP). The Buffalo RMP will replace the current Buffalo RMP. The revised Buffalo Field Office RMP will provide future direction for managing approximately 800,000 acres of U.S. Bureau of Land Management (Bureau)-administered surface land and 4.7-million acres of Bureau–administered mineral estate in Campbell, Johnson, and Sheridan counties in north-central Wyoming. Emerging issues and changing laws necessitate revision of the Buffalo RMP as described in the 2008 scoping notice. The Bureau is requesting the help of the public in identifying additional issues to be addressed in the planning effort.

In response to your request to review the proposed action, we are providing you with comments on (1) threatened and endangered species, (2) migratory birds, and (3) wetlands and riparian areas. The Service provides recommendations for protective measures for threatened and endangered species in accordance with the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Protective measures for migratory birds are provided in accordance with the Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703 and the Bald and Golden Eagle Protection Act (BGEPA), 16 U.S.C. 668. Wetlands are afforded protection under Executive Orders 11990 (wetland protection) and 11988 (floodplain management), as well as section 404 of the Clean Water Act. Other fish and wildlife resources are considered under the Fish and Wildlife Coordination Act and the Fish and Wildlife Act of 1956, as amended, 70 Stat. 1119, 16 U.S.C. 742a-742j.

Threatened and Endangered Species
The following threatened or endangered species could occur in the project area:

Black-footed ferret: Black-footed ferrets (*Mustela nigripes*) may be affected if prairie dog towns are impacted. Please be aware that black-footed ferret surveys are no longer recommended in black-tailed prairie dog towns (see our February 2, 2004, letter previously provided to your

office). However, we encourage the Bureau to protect all prairie dog towns for their value to the prairie ecosystem and the many species that rely on them. We further encourage you to analyze potentially disturbed prairie dog towns for their value to future black-footed ferret reintroduction.

Blowout penstemon: Blowout penstemon (*Penstemon haydenii*) is a perennial herb with stems less than 12 inches tall. The inflorescence is 2-6 inches long and has 6-10 compact whorls of milky-blue to pale lavender flowers. Blowout penstemon was listed as endangered on October 1 1987. Blowout penstemon is known from multiple populations in western Nebraska (Fertig 2001). The plant's current known range in Wyoming consists of the Ferris dunes area in northwest Carbon County where the plant is restricted to two habitat types: steep, northwest facing slopes of active sand dunes with less than 5 percent vegetative cover; and on north facing sandy slopes, on the lee side of active blowouts with 25-40 percent vegetative cover. Known populations in Wyoming are found between 6680-7440 feet (Fertig 2001). However, recent surveys have indicated that systematic surveys may be warranted in some lower elevations (below 6700 feet) in Wyoming where active sand blowout features occur (BLM 2005, Fertig 2001).

Blowouts are formed as strong winds deposit sands from the windward side of a dune to the leeward side and result in a sparsely vegetated crater-like depression. Associated vegetation includes blowout grass, thickspike wheatgrass, lemon scurfpea, Indian ricegrass and western wheatgrass. Threats to the plant occur when sand dunes are removed or overly disturbed by vehicular traffic. Surveys should be conducted from mid-June to early-July when flowering occurs by knowledgeable botanists trained in conducting rare plant surveys. The Service does not maintain a list of "qualified" surveyors but can refer those wishing to become familiar with the blowout penstemon to experts who can provide training/services.

Ute ladies'-tresses: Ute ladies'-tresses (*Spiranthes diluvialis*) is a perennial, terrestrial orchid, 8 to 20 inches tall, with white or ivory flowers clustered into a spike arrangement at the top of the stem. *S. diluvialis* typically blooms from late July through August; however, depending on location and climatic conditions, it may bloom in early July or still be in flower as late as early October. *S. diluvialis* is endemic to moist soils near wetland meadows, springs, lakes, and perennial streams where it colonizes early successional point bars or sandy edges. The elevation range of known occurrences is 4,200 to 7,000 feet (although no known populations in Wyoming occur above 5,500 feet) in alluvial substrates along riparian edges, gravel bars, old oxbows, and moist to wet meadows. Soils where *S. diluvialis* have been found typically range from fine silt/sand, to gravels and cobbles, as well as to highly organic and peaty soil types. *S. diluvialis* is not found in heavy or tight clay soils or in extremely saline or alkaline soils. *S. diluvialis* seems intolerant of shade and small scattered groups are found primarily in areas where vegetation is relatively open. Surveys should be conducted by knowledgeable botanists trained in conducting rare plant surveys. *S. diluvialis* is difficult to survey for primarily due to its unpredictability of emergence of flowering parts and subsequent rapid desiccation of specimens. The Service does not maintain a list of "qualified" surveyors but can refer those wishing to become familiar with the orchid to experts who can provide training or services.

Species of Concern

Greater Sage-grouse: The Service is currently conducting a review to determine if the greater sage-grouse (*Centrocercus urophasianus*) warrants listing. Greater sage-grouse are dependent on sagebrush habitats year-round. Habitat loss and degradation, as well as loss of population connectivity have been identified as important factors contributing to the decline of greater sage-

grouse populations rangewide (Braun 1998, Wisdom *et al.* 2002). Therefore, any activities that result in loss or degradation of sagebrush habitats that are important to this species should be closely evaluated for their impacts to sage-grouse. If important breeding habitat (leks, nesting, or brood rearing habitat) is present in the project area, the Service recommends no project-related disturbance March 1 through June 30, annually. Minimization of disturbance during lek activity, nesting, and brood rearing is critical to sage-grouse persistence within these areas. Likewise, if important winter habitats are present (Doherty *et al.* 2008), we recommend no project-related disturbance November 15 through March 14, annually.

We recommend you contact the Wyoming Game and Fish Department to identify important greater sage-grouse habitats within the project area, and appropriate mitigative measures to minimize potential impacts from the proposed project. The Service recommends surveys and mapping of important greater sage-grouse habitats where local information is not available. The results of these surveys should be used in project planning, to minimize potential impacts to this species. No project activities that may exacerbate habitat loss or degradation should be permitted in important habitats. Additionally, unless site-specific information is available, greater sage-grouse habitat should be managed following the guidelines by Connelly *et al.* 2000 (also known as the Western Association of Fish and Wildlife Agencies [WAFWA] guidelines).

In Wyoming, information suggests that greater sage-grouse populations are negatively affected by energy development activities, especially those that degrade important sagebrush habitat, even when mitigative measures are implemented (Braun 1998, Lyon 2000, Naugle *et al.* 2006). Greater sage-grouse populations can repopulate areas developed for resource extraction after habitat reclamation for the species (Braun 1987). However, there is no evidence that populations attain their previous levels and reestablishment of sage-grouse in a reclaimed area may take 20 to 30 years, or longer (Braun 1998). Therefore, this project should be carefully evaluated for long-term and cumulative effects on the greater sage-grouse, since reclamation may not restore populations to pre-activity levels. The Bureau should ensure this activity does not exacerbate greater sage-grouse declines on either a local or range-wide level.

Black-tailed prairie dog: The Service is currently conducting a review to determine if the black-tailed prairie dog (*Cynomys ludovicianus*) warrants listing under the Act (73 FR 73211). The black-tailed prairie dog may be found scattered in remnant populations throughout much of the range that it once occupied. A significant portion of existing occupied habitat rangewide occurs in a few large complexes. We encourage you to protect all prairie dog towns for their value to the prairie ecosystem and the many species that rely on them.

Migratory Birds

Under the MBTA and BGEPA, the Federal agency has a mandatory obligation to protect the many species of migratory birds, including eagles and other raptors which may occur on lands under its jurisdiction. Of particular focus are the species identified in the Service's *Birds of Conservation Concern 2002.* In accordance with the Fish and Wildlife Coordination Act (16 USC 2912 (a)(3)), this report identifies "species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing" under the Act. This report is intended to stimulate coordinated and proactive conservation actions among Federal, State, and private partners and is available at http://www.fws.gov/migratorybirds/reports/bcc2002.pdf.

In order to promote the conservation of migratory bird populations and their habitats, the Service recommends that the Federal agency implement those strategies outlined within the Memorandum of Understanding directed by the President of the U.S. under Executive Order 13186, where possible.

During project planning analysis of the following information is recommended to determine project effects to migratory birds:

1. The current status and habitat use of migratory birds in the project area. This may include number of individuals, breeding pairs, population trends, and active nests within and adjacent to the project area.
2. An analysis of the effects of the proposed action on migratory birds and their habitats. Measures that will reduce or eliminate adverse impacts to migratory birds, including protective buffers, seasonal restrictions, maintenance of habitat within the project area, raptor-proofing power lines, and netting of waste pits.
3. The projected short and long term impacts to migratory birds and their trends during and after project completion using monitoring, modeling and current literature.

Potential adverse effects to migratory birds from power lines should be identified and every attempt to mitigate such effects should be implemented. Structures that are identified as affecting birds should be made safe to prevent subsequent mortalities. If you determine that power poles and/or stretches of power line are resulting in electrocution of migratory birds, especially raptors, the Service requests that specific information be documented regarding these mortalities. Based on regulations pursuant to the MBTA and BGEPA, migratory bird carcasses may only be collected, possessed or moved by state game wardens, Service refuge officers, Service special agents, or persons holding a valid salvage permit issued by the Service and the applicable state. When a migratory bird mortality is observed the Service recommends that as much of the following information as possible be documented: legal location, GPS location, all identifying numbers from the nearest power pole, date of observation, species, photographs of pole (top section), and the dead bird, and directions to the scene. Please contact our office with the information and call or email Dominic Domenici of the Service's Law Enforcement Office at 307-261-6365 /dominic_domenici@fws.gov to report your observation and obtain further guidance. The Service appreciates your efforts to protect migratory birds.

Wetlands

The functions and values of wetlands are well documented and are especially important in the arid west. Substantial degradation diminishes the effectiveness of wetlands to function as food, cover, and breeding sites for wetland dependent species; sediment transport systems; water retention/storage sites; contaminant sinks; and chemical exchange sites. To ensure the Service has sufficient information to assess project impacts on wetlands, assessments should include:

1. An enumeration of the acreage of wetlands, by type, impacted by the proposed action.
2. A discussion of why wetlands cannot be avoided.
3. A description of the functions and values of the wetlands, including sediment transport, water storage, habitat for aquatic and terrestrial organisms, and contaminant sinks, as well as the potential risks of water removal for these functions and values.

4. Measures that will reduce or eliminate adverse impacts to wetlands such as a mitigation plan to offset unavoidable impacts, protective buffers, seasonal and physical restrictions, maintenance of the natural hydrograph, and development and implementation of a monitoring program to track the effectiveness of mitigation measures.
5. Results of wetland monitoring or management activities in, or adjacent to, the proposed project site.
6. The anticipated short and long term effects to wetland and riparian areas during and after project completion.

We recommend addressing each of the above concerns where applicable to the project. We appreciate your efforts to ensure the conservation of Wyoming's natural resources. If you have questions regarding this letter or resources described above, please contact Alex Schubert of my office at the letterhead address or phone (307) 772-2374, extension 238.

cc: WGFD, Statewide Habitat Protection Coordinator, Cheyenne, WY (M. Flanderka)
WGFD, Non-Game Coordinator, Lander, WY (B. Oakleaf)

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Tribal Consultation Letter

Lldone 9-19-08

SEP 12 2008

In Reply Refer To:
1610/Buffalo RMP Revision

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

Mr. Carl Venne
Crow Tribal Council
P.O. Box 159
Crow Agency, MT 59022

Dear Mr. Venne:

The Buffalo Field Office is revising its 1985 land use plan. The revised Buffalo Resource Management Plan (RMP) will serve as our general direction for all resource and land use management decisions for the BLM-administered public lands and resources in our administrative area. The plan will guide the use, protection, and management of natural and cultural resources on the public lands in Campbell, Johnson, and Sheridan counties in Wyoming.

In an effort to keep you informed of the status of our planning effort, we are contacting tribes who have previously expressed cultural concerns relating to the planning area, or whose traditional lands coincide with the planning area. We greatly appreciate the coordination we have accomplished with you in the past and would like to continue our relationship.

We would like to invite you to become a cooperating agency. Cooperating agency status is available to government entities with jurisdiction by law or special expertise. A cooperating agency provides staff to the BLM planning team to develop analysis for which they have particular expertise. The cooperating agency must develop a Memorandum of Understanding with the federal agency and must fund its own participation. Please note that the tribe's participation as a cooperating agency does not satisfy the BLM's obligation to consult on a government-to-government basis. Therefore, regardless of your tribe's decision to participate or not as a cooperating agency, our government-to-government consultation will continue.

Enclosed for your consideration are several documents: 1) a cooperating agency return form and self-addressed, stamped envelope for ease in responding to our invitation, 2) two announcements on no-cost training opportunities sponsored by the BLM in the near future along with a listing of hotel accommodations in the Buffalo area, and 3) an example Memorandum of Understanding to be executed should you accept our invitation to become a cooperator in the RMP revision.

We value your knowledge, concerns, and perspectives relating to the planning area. If you would like further information regarding cooperating agency status, please contact Linda Slone, Project Manger, at 307-261-7520. With regard to cultural heritage issues, you may wish to contact Buck Damone, Archaeologist, at 307-684-1100.

Sincerely,

/s/ Paul Beels
Acting Field Manager
Buffalo Field Office

Chris E. Hanson
Field Manager, Casper

5 Attachments:
1 – Cooperating Agency Return Form
2 – Planning Nuts & Bolts Training
3 – Cooperating Agency Training with Economic Profile System Workshop
4 – List of Buffalo Motels
5 – Example Memorandum of Understanding

cc: Mr. Dale Old Horn
Crow Tribal Cultural Resources
P.O. Box 159
Crow Agency, MT 59022

bcc: Buffalo RMP Revision – Administrative Record (LSlone)
L.Slone:lms:09/19/08

Appendix D. Best Management Practices

Best management practices (BMPs) are environmental protection measures developed by governmental bodies, industry, and scientific or other working groups. BMPs are state-of-the-art mitigation measures applied on a site-specific basis to reduce, prevent, or avoid adverse environmental or social impacts. These practices are applied to help ensure that development is conducted in an environmentally responsible manner. Some BMPs are as simple as choosing a paint color that helps oil and natural gas equipment blend with the natural surroundings, turning development almost invisible. Other BMPs may reduce the amount of vegetation lost to development, may speed the re-growth of vegetation, or may reduce the amount of wildlife disturbance in important habitats. Public land users are encouraged to review these practices, incorporate them where appropriate, or develop better methods for achieving the same goal.

The purpose of this section is not to select certain practices or designs and require that only those be used. It is not possible to evaluate all the known practices and make determinations as to which are best. BMPs should be matched and adapted to meet the site-specific requirements of the management action, project and local environment. No one management practice is best suited to every site or situation. BMPs must be adaptive and monitored regularly to evaluate effectiveness.

The following sources contain information regarding the development and implementation of BMPs. These references are not to be considered as exclusive sources of information; rather, they should be used as a starting point when evaluating specific BMPs during project design and implementation.

D.1. Bureau of Land Management (BLM) BMP Resources

BLM BMPs: This website provides an introduction to BLM BMPs with links to BLM contacts, specific resources, and other BMP links, and other resources related to BLM BMPs. http://www.blm.gov/bmp/

General Information for Oil and Gas BMPs: This resource provides general information regarding BLM BMPs for oil and gas development. A sample of BMPs are provided with a brief description of types of BMPs and terminology. http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/general_information.html

BMP Frequently Asked Questions: The link below provides responses to frequently asked questions regarding BLM BMPs. http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/frequently_asked_questions.html

BMP Technical Information: The slide shows at the link below provide a detailed look at a menu of possible oil and natural gas development BMPs. These slide shows are only a starting point and are not intended to serve as a comprehensive list of BMPs. http://www.blm.gov/nhp/efoia/wo/fy05/im2005-069.htm

Oil and Gas Exploration – The Gold Book: The publication Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (commonly referred to as The Gold Book) was developed to assist operators by providing information on the requirements for obtaining permit approval and conducting environmentally responsible oil and gas operations on

federal lands and on private surface over federal minerals (split-estate). Split-estate surface owners will also find the Gold Book to be a useful reference guide. In 2007, the Gold Book was updated to incorporate changes resulting from the new Onshore Oil and Gas Order No. 1 regulations. http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/gold_book.html

Visual Resources: There are numerous design techniques that can be used to reduce the visual impacts from surface-disturbing projects. The techniques described here should be used in conjunction with BLM's visual resource contrast rating process wherein both the existing landscape and the proposed development or activity are analyzed for their basic elements of form, line, color, and texture. http://www.blm.gov/wo/st/en/prog/Recreation/recreation_national/RMS/2.html

While written for renewable energy development, Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands (BLM 2013a) provides visual BMPs applicable to many land use activities. http://www.blm.gov/wo/st/en/prog/energy/renewable_energy.html

Renewable Energy Development BMPs: The following resources provide information on BMPs related to renewable energy development.

- *Wind Energy Development Programmatic Environmental Impact Statement [EIS]:* The scope of the Wind Energy Programmatic EIS analysis includes an assessment of the positive and negative environmental, social, and economic impacts; discussion of relevant mitigation measures to address these impacts; and identification of appropriate, programmatic policies and BMPs to be included in the proposed Wind Energy Development Program. http://windeis.anl.gov/documents/fpeis/index.cfm

- *BLM Instruction Memorandum [IM] 2009-043, Rights-of-Way [ROW], Wind Energy:* This IM further clarifies the BLM Wind Energy Development policies and BMPs provided in the Wind Energy Development Programmatic EIS. http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2009/IM_2009-043.html

- *Record of Decision for the Geothermal Resource Leasing Programmatic Environmental Impact Statement:* This ROD provides a list of sample BMPs that have been collected from various BLM and United States Forest Service documents addressing geothermal and fluid mineral leasing and development, including resource management plans (RMPs), forest plans, and environmental reports for geothermal leasing and development. The document provides guidance on incorporating BMPs, as appropriate, into the geothermal permit application or as Conditions of Approval (COAs). http://www.blm.gov/pgdata/etc/medialib/blm/wo/MINERALS__REALTY__AND_RESOURCE_PROTECTION_/energy/geothermal_eis/final_programmatic.Par.90935.File.dat/ROD_Geothermal_12-17-08.pdf

- *Solar Energy Development Programmatic Environmental Impact Statement:* This Programmatic EIS is currently under development (as of Summer 2011) and when finalized will include policies and mitigation measures adopted as part of the proposed solar energy deployment program. The Solar Energy Development Programmatic EIS will identify for the Department of Energy, industry, and stakeholders the best practices for deploying solar energy and ensuring minimal impact to natural and cultural

resources on BLM-administered lands or other federal, state, tribal, or private lands. http://www.solareis.anl.gov/

General Information for Management of Land Boundaries BMPs: The Departmental Manual 600 Chapter 5, Standards for Federal Lands Boundary Evidence and BLM H-9600-1, Cadastral Survey Handbook, provides general information regarding BLM BMPs for management of public land boundaries. Samples of BMPs are available with a brief description of types of BMPs and terminology. http://www.blm.gov/wo/st/en/prog/more/cadastralsurvey/cadastral_review_of.html.

D.2. Other Agency BMP Resources

U.S. Environmental Protection Agency (EPA) BMP Resources

Healthy Watersheds: This resource provides conservation approaches and tools designed to ensure healthy watersheds remain intact. The website provides example approaches that are generally site-specific, and watershed managers are encouraged to use the examples as guidance in developing local conservation strategies. The website also supplies outreach strategies to encourage stakeholder engagement in conservation and protection of healthy watersheds. http://www.epa.gov/owow/nps/

Storm Water BMPs: This online menu provides BMPs designed to meet the minimum requirements for six control measures specified by the EPA's Phase II Stormwater Program. The control measures include public education, public involvement, illicit discharge detection and elimination, construction, post-construction, and pollution prevention/good housekeeping. The menu also provides case studies assessing the performance of various storm water BMPs. http://cfpub.epa.gov/npdes/stormwater/menuofbmps/menu.cfm

Pasture, Rangeland, and Grazing Operations BMPs: The link below provides BMPs compiled by the EPA to prevent or reduce pollution associated with livestock grazing. Topics include practices to reduce methane production, managing nonpoint source pollution, controlled grazing, reducing animal feeding operation pollution, and manure management. http://www.epa.gov/oecaagct/anprgbmp.html

U.S. Department of Agriculture – Natural Resources Conservation Service (NRCS) BMP Resources

National Conservation Practice Standards: This website provides links for national conservation practices developed by the NRCS on topics such as herbaceous wind barriers, feed management, forest stand improvement, and irrigation management. The conservation practice standard contains information on why and where the practice is applied, and sets forth the minimum quality criteria that must be met during the application of that practice in order for it to achieve its intended purpose. http://www.nrcs.usda.gov/Technical/Standards/nhcp.html

National Range and Pasture Handbook: Developed by NRCS grazing land specialists, this handbook provides a source of expertise to guide cooperators in solving resource problems and in sustaining or improving their grazing lands resources and operations. http://www.glti.nrcs.usda.gov/technical/publications/nrph.html

Wyoming Game and Fish Department BMP Resources

Aquatic Invasive Species: This resource provides information about how to recognize aquatic invasive species and how to avoid introducing them or spreading them through Wyoming's waters. The website contains links to external resources including a link to waterbodies in the United States currently known to be impacted by zebra and quagga mussels. The website also contains information about how to decontaminate equipment and watercraft suspected of harboring aquatic invasive species. http://gf.state.wy.us/fish/AIS/index.asp

D.3. Greater Sage-Grouse: Required Design Features and Best Management Practices

D.3.1. Required Design Features

Required Design Features (RDFs) are required for certain activities in Greater Sage-Grouse habitat. RDFs apply to locatable minerals to the extent permitted by applicable law and subject to valid existing rights.RDFs establish the minimum specifications for certain activities to help mitigate adverse impacts. However, the applicability and overall effectiveness of each RDF cannot be fully assessed until the project level when the project location and design are known. Because of site-specific circumstances, some RDFs may not apply to some projects (e.g., a resource is not present on a given site) and/or may require slight variations (e.g., a larger or smaller protective area). All variations in RDFs would require that at least one of the following be demonstrated in the National Environmental Policy Act (NEPA) analysis associated with the project/activity:

- A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g., due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable.
- An alternative RDF is determined to provide equal or better protection for Greater Sage-Grouse or its habitat.
- A specific RDF will provide no additional protection to Greater Sage-Grouse or its habitat.

The practices listed in this section are from the BLM National Technical Team (NTT) report (BLM 2012h) and are treated in the RMP as RDFs to ensure regulatory certainty for the conservation of Greater Sage-Grouse. The BLM will adopt them as operational requirements, through issuance of the RMP Record of Decision (ROD). The RDFs are primarily written for priority Greater Sage-Grouse habitat (Core Populations Areas and Connectivity Corridors). Within general habitat, the RDFs applied are determined on a project specific basis. The BLM may add additional RDFs as deemed necessary by further environmental analysis and as developed through coordination with other federal, state, and local regulatory and resource agencies. Because practices change, based on new information, the RDFs will be updated periodically.

The EIS for the RMP may not decide or dictate the exact wording or inclusion of the RDFs. Rather, they are used in the RMP process as a tool to help develop the RMP alternatives and to provide a baseline for comparative impact analysis in arriving at RMP decisions. They will be used in the same manner in analyzing activity plans and other site-specific proposals. Design features and management practices and their wording can be a matter of policy. As such, specific wording is subject to change primarily through administrative review, not through the RMP and

EIS process. Any further changes that may be made in the continuing refinement of these RDFs and any development of program-specific standard stipulations will be handled in another forum, including appropriate public involvement and input.

BLM reserves the right to modify the operations of surface-disturbing or disruptive activities as part of the statutory requirements for environmental protection. Those measures selected for implementation will be identified in the site-specific ROD or decision record for those activities and will inform a potential lessee, permittee, or operator of the requirements that must be met when using BLM-administered public lands and minerals. These measures have been written in a format that will allow for either their direct use as stipulations or operating standards or in addition to specific or specialized mitigation following the submission of a detailed development plan or other project proposal and an environmental analysis. These operating standards are given as acceptable methods for mitigating anticipated effects and achieving the desired plan outcomes but are not prescribed as the only method for achieving the outcomes.

Because of site-specific circumstances, some RDFs may not apply to all activities (e.g., a resource or conflict is not present on a given site) and/or may require slight variations. Proposed variations will be analyzed and may be applied in the site specific permitting process. All variations will require appropriate analysis and disclosure as part of activity authorization. It is anticipated that variations will be approved in very limited circumstances and only in coordination with the Wyoming Game and Fish Department (WGFD) and/or U.S. Fish and Wildlife Department (USFWS).

Project proponents are encouraged to include all appropriate RDFs in their proposals. The BLM will require application of all appropriate measures, warranted by site-specific analysis, in order to avoid, minimize, rectify, reduce, or compensate for impacts. RDFs not included in project proposals and determined appropriate from the site-specific analysis will be required as COAs. Additional COAs developed through consultation with other federal, state, and local regulatory and resource agencies may be applied when supported by site-specific analysis.

The proponent must implement all identified measures because they are commitments made as part of the BLM decision. Because the decision document creates a clear obligation for the BLM to ensure any proposed mitigation adopted in the environmental analysis is performed, there is the expectation that applied mitigation will lead to a reduction of environmental impacts in the implementation stage and include binding mechanisms for enforcement (Council on Environmental Quality Memorandum for Heads of Federal Departments and Agencies 2011). The determination of adequate application of the mitigation measures and conservation actions for specific projects will remain with the BLM's authorized officer.

Those resource activities or programs currently without a standardized set of permit or operation stipulations can use the RDFs for Greater Sage-Grouse as stipulations or as COAs or as a baseline for developing specific stipulations for a given activity or program.

At the project level, to prioritize certain general habitat areas over marginal or substandard habitat, consideration should be given to:

- The capability of the habitat to provide connectivity among Greater Sage-Grouse Core Population Areas;
- Habitats occupied by Greater Sage-Grouse where enhancing habitat can offset losses to habitat or populations elsewhere; and

- The potential to replace lost priority habitat or needed changes in priority habitat resulting from perturbations or disturbances to support Greater Sage-Grouse objectives.

Lands and Realty

- Where existing leases or ROWs have had some level of development (road, fence, well, etc.) and are no longer in use, reclaim the site by removing these features and restoring the habitat. Within designated priority habitat, reclaim by removing these features and restoring the habitat of these ROW that are no longer in use.

West Nile virus

- Increase the size of ponds to accommodate a greater volume of water than is discharged. This will result in un-vegetated and muddy shorelines that breeding *Cx. tarsalis* avoid (De Szalay and Resh 2000). This modification may reduce *Cx. tarsalis* habitat but could create larval habitat for *Culicoides sonorensis*, a vector of blue tongue disease, and should be used sparingly (Schmidtmann et al. 2000). Steep shorelines should be used in combination with this technique whenever possible (Knight et al. 2003).
- Build steep shorelines to reduce shallow water (greater than 60 centimeters) and aquatic vegetation around the perimeter of impoundments (Knight et al. 2003). Construction of steep shorelines also will create more permanent ponds that are a deterrent to colonizing mosquito species like *Cx. tarsalis* which prefer newly flooded sites with high primary productivity (Knight et al. 2003).
- Maintain the water level below that of rooted vegetation for a muddy shoreline that is unfavorable habitat for mosquito larvae. Rooted vegetation includes both aquatic and upland vegetative types. Avoid flooding terrestrial vegetation in flat terrain or low lying areas. Aquatic habitats with a vegetated inflow and outflow separated by open water produce 5-10 fold fewer *Culex* mosquitoes than completely vegetated wetlands (Walton and Workman 1998). Wetlands with open water also had significantly fewer stage III and IV instars which may be attributed to increased predator abundances in open water habitats (Walton and Workman 1998).
- Construct dams or impoundments that restrict down slope seepage or overflow by digging ponds in flat areas rather than damming natural draws for effluent water storage, or lining constructed ponds in areas where seepage is anticipated (Knight et al. 2003).
- Line the channel where discharge water flows into the pond with crushed rock, or use a horizontal pipe to discharge inflow directly into existing open water, thus precluding shallow surface inflow and accumulation of sediment that promotes aquatic vegetation.
- Line the overflow spillway with crushed rock, and construct the spillway with steep sides to preclude the accumulation of shallow water and vegetation.
- Fence pond site to restrict access by livestock and other wild ungulates that trample and disturb shorelines, enrich sediments with manure and create hoof print pockets of water that are attractive to breeding mosquitoes.

Fluid Minerals

- Use only closed-loop systems for drilling operations, with no reserve pits.
- Require noise shields when drilling during the lek, nesting, brood-rearing, and wintering seasons.
- Design new transmission towers with anti-perching devices and retrofit existing towers to discourage use by raptors.
- Locate new compressor stations outside priority habitats and design them to reduce noise that may be directed towards priority habitat.
- Locate man camps outside priority Greater Sage-Grouse habitats.

- Roads (Priority Habitat Area)
  - Design roads to an appropriate standard no higher than necessary to accommodate their intended purpose.
  - Locate roads to avoid important areas and habitats.
  - Coordinate road construction and use among ROW holders.
  - Construct road crossing at right angles to ephemeral drainages and stream crossings.
  - Establish slow speed limits on BLM system roads to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds.
  - Establish trip restrictions (Lyon and Anderson 2003) or minimization through use of telemetry and remote well control (e.g., Supervisory Control and Data Acquisition).
  - Do not issue ROWs to counties on newly constructed energy development roads, unless for a temporary use consistent with all other terms and conditions included in this document.
  - Restrict vehicle traffic to only authorized users on newly constructed routes (use signing, gates, etc.).
  - Apply dust abatement practices on roads and pads.
  - Close and rehabilitate duplicate roads.
- Roads (General Habitat)
  - Design roads to an appropriate standard no higher than necessary to accommodate their intended purpose.
  - Do not issue ROWs to counties on energy development roads, unless for a temporary use consistent with all other terms and conditions included in this document.
  - Establish speed limits to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds.
  - Coordinate road construction and use among ROW holders.
  - Construct road crossing at right angles to ephemeral drainages and stream crossings.
  - Apply dust abatement practices on roads and pads.
  - Close and reclaim duplicate roads, by restoring original landform and establishing desired vegetation.
- Operations (Priority Habitat)
  - Clean up refuse to avoid attracting predators (Bui et al. 2010).
  - Cluster disturbances, operations (fracture stimulation, liquids gathering, etc.), and facilities.
  - Use directional and horizontal drilling to reduce surface disturbance.
  - Place infrastructure in already disturbed locations where the habitat has not been restored.
  - Consider using oak (or other material) mats for drilling activities to reduce vegetation disturbance and for roads between closely spaced wells to reduce soil compaction and maintain soil structure to increase likelihood of vegetation reestablishment following drilling.
  - Apply a phased development approach with concurrent reclamation.
  - Place liquid gathering facilities outside of priority areas. Have no tanks at well locations within priority areas (minimizes perching and nesting opportunities for ravens and raptors and truck traffic). Pipelines must be under or immediately adjacent to the road (Bui et al. 2010).
  - Use remote monitoring techniques for production facilities and develop a plan to reduce the frequency of vehicle use (Lyon and Anderson 2003).
  - Restrict the construction of tall facilities and fences to the minimum number and amount needed.
  - Site and/or minimize linear ROWs to reduce disturbance to sagebrush habitats.
  - Collocate new utility developments (powerlines, pipelines, etc.) and transportation routes in existing utility or transportation corridors.
  - Bury new distribution powerlines except when an existing line is already in place.

- Collocate powerlines, flow lines, and small pipelines under or immediately adjacent to existing roads (Bui et al. 2010).
- Design or site permanent structures which create movement (e.g., a pump jack) to minimize impacts to Greater Sage-Grouse.
- Cover (e.g., fine mesh netting or use other effective techniques) all drilling and production pits and tanks regardless of size to reduce Greater Sage-Grouse mortality.
- Equip tanks and other above ground facilities with structures or devices that discourage nesting of raptors and corvids.
- Control the spread and effects of non-native plant species (Evangelista et al. 2011) (e.g., by washing vehicles and equipment).

- Operations (General Habitat)
  - Cluster disturbances, operations (fracture stimulation, liquids gathering, etc.), and facilities.
  - Use directional and horizontal drilling to reduce surface disturbance.
  - Clean up refuse (Bui et al. 2010).
  - Restrict the construction of tall facilities and fences to the minimum number and amount needed.
  - Cover (e.g., fine mesh netting or use other effective techniques) all drilling and production pits and tanks regardless of size to reduce Greater Sage-Grouse mortality.
  - Equip tanks and other above ground facilities with structures or devices that discourage nesting of raptors and corvids.
  - Use remote monitoring techniques for production facilities and develop a plan to reduce the frequency of vehicle use.
  - Control the spread and effects from non-native plant species. (e.g., by washing vehicles and equipment.)
  - Apply West Nile Virus (WNv) BMPs (Doherty 2007).
- Reclamation
  - Include objectives for ensuring habitat restoration to meet sage-grouse habitat needs in reclamation practices/sites (Pyke 2011). Address post reclamation management in reclamation plan such that goals and objectives are to protect and improve Greater Sage-Grouse habitat needs.
  - Maximize the area of interim reclamation on long-term access roads and well pads including reshaping, topsoiling and revegetating cut and fill slopes.
  - Restore disturbed areas at final reclamation to the pre-disturbance landforms and desired plant community.
  - Implement irrigation during interim or final reclamation for sites where establishment of seedlings has been shown or is expected to be difficult due to dry conditions.
  - Use mulching, soil amendments, and/or erosion blankets to expedite reclamation and to protect soils.

Locatable Minerals

RDFs apply to locatable minerals to the extent permitted by applicable law and subject to valid existing rights.

- Locate new compressor stations outside priority habitats and design them to reduce noise that may be directed towards priority habitat.
- Locate man camps outside priority sage-grouse habitats.
- Roads
  - Design roads to an appropriate standard no higher than necessary to accommodate their intended purpose.
  - Locate roads to avoid important areas and habitats.

- Coordinate road construction and use among ROW holders.
- Construct road crossing at right angles to ephemeral drainages and stream crossings.
- Establish speed limits on BLM system roads to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds.
- Do not issue ROWs to counties on mining development roads, unless for a temporary use consistent with all other terms and conditions included in this document.
- Restrict vehicle traffic to only authorized users on newly constructed routes (e.g., use signing, gates, etc.).
- Use dust abatement practices on roads and pads.
- Close and reclaim duplicate roads, by restoring original landform and establishing desired vegetation.

- Operations
  - Cluster disturbances associated with operations and facilities as close as possible.
  - Place infrastructure in already disturbed locations where the habitat has not been restored.
  - Restrict the construction of tall facilities and fences to the minimum number and amount needed.
  - Site and/or minimize linear ROWs to reduce disturbance to sagebrush habitats.
  - Place new utility developments (powerlines, pipelines, etc.) and transportation routes in existing utility or transportation corridors.
  - Bury power lines.
  - Cover (e.g., fine mesh netting or use other effective techniques) all pits and tanks regardless of size to reduce sage-grouse mortality.
  - Equip tanks and other above ground facilities with structures or devices that discourage nesting of raptors and corvids.
  - Control the spread and effects of non-native plant species (Gelbard and Belnap 2003; Bergquist et al. 2007).
  - Apply WNv BMPs (Doherty 2007).
  - Require Greater Sage-Grouse-safe fences around sumps.
  - Clean up refuse (Bui et al. 2010).
  - Locate man camps outside of priority Greater Sage-Grouse habitats.
- Reclamation
  - Include restoration objectives to meet Greater Sage-Grouse habitat needs in reclamation practices/sites.
  - Address post reclamation management in reclamation plan such that goals and objectives are to protect and improve sage-grouse habitat needs.
  - Maximize the area of interim reclamation on long-term access roads and well pads including reshaping, topsoiling and revegetating cut and fill slopes.
  - Restore disturbed areas at final reclamation to pre-disturbance landform and desired plant community.
  - Irrigate interim reclamation as necessary during dry periods.

Solid Minerals – Coal

- For coal mining operations on existing leases: in priority sage-grouse habitat areas, place any new appurtenant facilities outside of priority areas. Where new appurtenant facilities associated with the existing lease cannot be located outside the priority sage-grouse habitat area, co-locate new facilities within existing disturbed areas. If this is not possible, then build any new appurtenant facilities to the absolute minimum standard necessary.

Fuels Management (Original source BLM IM 2011-138)

- Design fuels treatment objective to protect existing sagebrush ecosystems, modify fire behavior, restore native plants, and create landscape patters which most benefit sage-grouse habitat.
- Provide training to fuels treatment personnel on sage-grouse biology, habitat requirements, and identification of areas utilized locally.
- Use fire prescriptions that minimize undesirable effects on vegetation or soils (e.g., minimize mortality of desirable perennial plant species and reduce risk of hydrophobicity).
- Ensure proposed sagebrush treatments are planned with interdisciplinary input from BLM and/or state wildlife agency biologist and that treatment acreage is conservative in the context of surrounding Greater Sage-Grouse seasonal habitats and landscape.
- Ensure that treatments are configured in a manner (e.g., strips) that promotes use by sage-grouse (Connelly et al. 2000).
- Incorporate roads and natural fuel breaks into fuel break design.
- Power-wash all vehicles and equipment involved in fuels management activities prior to entering the area to minimize the introduction of undesirable and/or invasive plant species.
- Design vegetation treatment in areas of high frequency to facilitate firefighting safety, reduce the risk of extreme fire behavior; and to reduce the risk and rate of fire spread to sage-grouse priority habitats.
- Give priority for implementing specific sage-grouse habitat restoration projects in annual grasslands first to sites which are adjacent to or surrounded by sage-grouse priority habitat. Annual grasslands are second priority for restoration when the sites not adjacent to priority habitat, but within two miles of priority habitat. The third priority for annual grasslands habitat restoration projects are sites beyond two miles of priority habitat. The intent is to focus restoration outward from existing, intact habitat.
- As funding and logistics permit, restore annual grasslands to a species composition characterized by perennial grasses, forbs, and shrubs.
- Emphasize the use of native plant species, recognizing that non-native species may be necessary depending on the availability of native seed and prevailing site conditions.
- Remove standing and encroaching trees within at least 100 meters of occupied sage-grouse leks and other habitats (e.g., nesting, wintering, and brood rearing) to reduce the availability of perch sites for avian predators, as appropriate, and resources permit.
- Reduce the risk of vehicle or human-caused wildfires and the spread of invasive species by planting perennial vegetation (e.g., green-strips) paralleling road ROW.
- Strategically place and maintain pre-treated strips/areas (e.g., mowing, herbicide application, and strictly managed grazed strips) to ail in controlling wildfire should wildfire occur near key habitats or important restoration areas (such as where investments in restoration have already been made).
- In priority habitat, design and implement fuels treatments with an emphasis on protecting existing sagebrush ecosystems.
  - Do not reduce sagebrush canopy cover to less than 15 percent (Connelly et al. 2000; Hagen et al. 2007) unless a fuels management objective requires additional reduction in sagebrush cover to meet strategic protection of priority sage-grouse habitat and conserve habitat quality for the species. Closely evaluate the benefits of fuel break against the additional loss of sagebrush cover in the Environmental Assessment process.
  - Apply appropriate seasonal restrictions for implementing fuels management treatments according to the type of seasonal habitats present in a priority area.
  - Allow no fuels treatments in known winter range unless the treatments are designed to strategically reduce wildfire risk around or in the winter range and will maintain winter range habitat quality.

  - Do not use fire to treat sagebrush in less than 12-inch precipitation zones (e.g., Wyoming big sagebrush or other xeric sagebrush species; Connelly et al. 2000; Hagen et al. 2007; Beck et al. 2009). However, if as a last resort and after all other treatment opportunities have been explored and site specific variables allow, the use of prescribed fire for fuel breaks that would disrupt the fuel continuity across the landscape would be considered, in stands where cheatgrass is a very minor component in the understory (BLM 2012h).
  - If prescribed fire is to be used for vegetation treatments, the burn plan will clearly indicate how the Conservation Objective Team objectives will be met by its use, and why alternative techniques were not selected.
  - A risk assessment will be completed for implementation of prescribed fire in relation to the Greater Sage-Grouse goals and objectives.
  - Monitor and control invasive vegetation post treatment.
  - Rest treated areas from grazing for two full growing seasons unless vegetation recovery dictates otherwise (WGFD 2011).
  - Require use of native seeds for fuels management treatment based on availability, adaptation (site potential), and probability of success (Richards et al. 1998). Where probability of success or native seed availability is low, non-native seeds may be used as long as they meet sage-grouse habitat objectives (Pyke 2011).
  - Design post fuels management projects to ensure long term persistence of seeded or pretreatment native plants. This may require temporary or long-term changes in livestock grazing management, or other activities to achieve and maintain the desired condition of the fuels management project (Eiswerth and Shonkwiler 2006).
- Design fuels management projects in sage-grouse habitat to strategically and effectively reduce wildfire threats in the greatest area. This may require fuels treatments implemented in a more linear versus block design (Launchbaugh et al. 2007).
- During fuels management project design, consider the utility of using livestock to strategically reduce fine fuels (Diamond et al. 2009), and implement grazing management that will accomplish this objective (Davies et al. 2011; Launchbaugh et al. 2007). Consult with ecologists to minimize impacts to native perennial grasses.
- Restore annual grasslands to a species composition characterized by perennial grasses, forbs, and shrubs.
- Reduce the risk of vehicle or human-caused wildfires and the spread of invasive species by planting perennial vegetation (e.g., green-strips) paralleling road ROWs.
- Strategically place and maintain pre-treated strips/areas (e.g., mowing, herbicide application, and strictly managed grazed strips) to ail in controlling wildfire should wildfire occur near habitats or important restoration areas (such as where investments in restoration have already been made).

Fire Management (Original source BLM IM 2011-138)

- Develop state-specific sage-grouse toolboxes containing maps, a list of Resource Advisors (READs), contact information, local guidance, and other relevant information.
- Provide localized maps to dispatch offices and extended attack incident commanders for use in prioritizing wildfire suppression resources and designing suppression tactics.
- Assign a sage-grouse READ to all extended attack fires in or near priority Greater Sage-Grouse habitat. Prior to the fire season, provide training to sage-grouse READs on wildfire suppression organization, objectives, tactics, and procedures to develop a cadre of qualified individuals.
- On critical fire weather days, pre-position additional fire suppression resources to optimize a quick and efficient response in sage-grouse habitat areas.
- During periods of multiple fires, ensure line officers are involved in setting priorities.

- Locate wildfire suppression facilities (i.e., base camps, spike camps, drop points, staging areas, heli-bases) in areas where physical disturbance to sage-grouse habitat can be minimized. These include disturbed areas, grasslands, near roads/trails or in other areas where there is existing disturbance or minimal sagebrush cover.
- Power-wash all firefighting vehicles, to the extent possible, including engines, water tenders, personnel vehicles, and All-Terrain Vehicles prior to deploying in or near sage-grouse habitat areas to minimize noxious weed spread.
- Minimize unnecessary cross-country vehicle travel during fire operations in sage-grouse habitat.
- Minimize burnout operations in a sage-grouse habitat areas by constructing direct fireline whenever safe and practical to do so.
- Utilize retardant and mechanized equipment to minimize burned acreage during initial attack.
- As safety allows, conduct mop-up where the black adjoins unburned islands, dog legs, or other habitat features to minimize sagebrush loss.
- Protect wildland areas from wildfire originating on private lands, infrastructure corridors, and recreational areas.
- Design post Emergency Stabilization and Rehabilitation (ES&R) management to ensure long term persistence of seeded or pre-burn native plants. This may require temporary or long-term changes in livestock grazing and travel management, etc., to achieve and maintain the desired condition of ES&R projects to benefit sage-grouse (Eiswerth and Shonkwiler 2006).
- Post fire recovery must include establishing adequately sized exclosures (free of livestock grazing) that can be used to assess recovery.
- Where burned sage-grouse habitat cannot be fenced from other unburned habitat, the entire area (e.g., allotment/pasture) should be closed to grazing until recovered.
- Mowing of grass will be used in any fuelbreak fuels reduction project (roadsides or other areas).
- Any fuels treatments will focus on interfaces with human habitation or significant existing disturbances.
- In priority sage-grouse habitat areas, prioritize suppression immediately after firefighter and public safety to conserve the habitat.
- Prioritize native seed allocation for use in sage-grouse habitat in years when preferred native seed is in short supply.
- Use native plant seeds for vegetation seedings based on availability, adaptation (site potential), and probability of success (Richards et al. 1998). Where probability of success or native seed availability is low, non-native seeds may be used as long as they meet sage-grouse habitat conservation objectives (Pyke 2011).
- In fire prone areas where sagebrush seed is required for sage-grouse habitat restoration, consider establishing seed harvest areas that are managed for seed production (Armstrong 2007) and are a priority for protection from outside disturbances.
- Consider potential changes in climate (Miller et al. 2011) when proposing post-fire seedings using native plants. Consider seed collections from the warmer component within a species' current range for selection of native seed (Kramer and Havens 2009).

Habitat Restoration/Vegetation Management

- Include sage-grouse habitat parameters as defined by Connelly et al. (2000), Hagen et al. (2007) or if available, State Sage-Grouse Conservation plans and appropriate local information in habitat restoration objectives. Make meeting these objectives within priority sage-grouse habitat areas the highest restoration priority.

Recreation

- Only allow Special Recreation Permits in priority habitat that have neutral or beneficial effects to priority habitat areas.
- Do not construct new recreation facilities (e.g., campgrounds, trails, trailheads, staging areas) within Core/Connectivity Areas unless the development would have a neutral effect or be beneficial to Greater Sage-Grouse habitat (such as concentrating recreation, diverting use away from critical areas, etc.), or unless the development is required for visitor safety or resource protection.

Travel and Transportation Management

- Use existing roads, or realignments as described above to access valid existing rights that are not yet developed. If valid existing rights cannot be accessed via existing roads, then build any new road constructed to the absolute minimum standard necessary, and add the surface disturbance to the total disturbance in the priority area. If that disturbance exceeds 3 percent for that area, then make additional, effective mitigation necessary to offset the resulting loss of sage-grouse habitat.
- Allow no upgrading of existing routes that would change route category (road, primitive road, or trail) or capacity unless the upgrading would have minimal impact on sage-grouse habitat, is necessary for motorist safety, or eliminates the need to construct a new road.
- Limit route construction to realignments of existing designated routes if that realignment has a minimal impact on sage-grouse habitat, eliminates the need to construct a new road, or is necessary for motorist safety.
- Among other designation criteria from 43 Code of Federal Regulations (CFR) 8342.1(b), "areas and trails shall be located to minimize harassment of wildlife or significant disruption of wildlife habitats. Special attention will be given to protect endangered or threatened species and their habitats."
- Conduct restoration of roads, primitive roads and trails not designated in travel management plans. This also includes primitive route/roads that were not designated in Wilderness Study Areas and within lands with wilderness characteristics that have been selected for protection.
- In priority habitat, limit motorized travel to existing roads, primitive roads, and trails at a minimum, until such time as travel management planning is complete and routes are either designated or closed.
- Where off-road vehicles are causing or will cause considerable adverse effects upon soil, vegetation, wildlife, wildlife habitat, cultural resources, historical resources, threatened or endangered species, wilderness suitability, other authorized uses, or other resources, the affected areas shall be immediately closed to the type(s) of vehicle causing the adverse effect until the adverse effects are eliminated and measures implemented to prevent recurrence. This may include closure of routes or areas. (43 CFR 8341.2).
- When reseeding roads, primitive roads, and trails in priority habitat, use appropriate seed mixes and consider the use of transplanted sagebrush.

Rights-of-Ways and Corridors

- Evaluate and take advantage of opportunities to remove or modify existing powerlines within priority sage-grouse habitat areas. When possible, require perch deterrents on existing or new overhead facilities.
- Where existing leases or ROWs have had some level of development (road, fence, well, etc.) and are no longer in use, reclaim the site by removing these features and restoring the habitat. Within designated priority habitat reclaim by removing these features and restoring the habitat of these ROW that are no longer in use.
- Where new ROWs are necessary, co-locate new ROWs within existing ROWs where possible.

Additional RDFs Identified During the National Greater Sage-Grouse Planning Strategy

Fire and Fuels Management

- Work cooperatively with permittees, lessees and other landowners to develop grazing management strategies that integrate both public and private lands into single management units.
- Avoid using prescribed fire in Greater Sage-Grouse habitat unless evaluation of site-specific conditions demonstrate that there would be a net benefit for Greater Sage-Grouse. If prescribed fire is used in Greater Sage-Grouse habitat, include an analysis in the NEPA document that indicates how Greater Sage-Grouse goals and objectives will be addressed and met by its use, why alternative techniques were not selected, and a risk assessment to address how potential threats to Greater Sage-Grouse habitat would be minimized.
- If prescribed fire is to be used at the implementation level, at a minimum, the burn plan will indicate how Conservation Objective Team/land use plan objectives would be addressed and met and why alternative techniques were not selected.
- Avoid prescribed fire as a vegetation or fuels treatment in Wyoming big sagebrush or other xeric sagebrush species, or in areas with a potential for post-fire exotic annual dominance. However, after other treatment opportunities have been explored and as site-specific variables allow, prescribed fire could be used in these areas to meet specific fuels objectives that would maintain, improve, or restore Greater Sage-Grouse priority habitat (e.g., creation of fuel breaks that would disrupt the fuel continuity across the landscape in stands where annual invasive grasses are a minor component in the understory, burning slash piles from conifer reduction treatments, used as a component with other treatment methods to combat annual grasses and restore native plant communities).
- Allow no treatments in known winter range unless the treatments are designed to strategically reduce wildfire risk around and/or in the winter range and would protect, maintain, increase, or enhance winter range habitat quality.

Conifer Removal

- Remove conifers encroaching into sagebrush habitats. Prioritize treatments closest to occupied Greater Sage-Grouse habitats and near occupied leks, and where juniper encroachment is phase 1 or phase 2. Use of site-specific analysis and principles like those included in the FIAT report and other ongoing modeling efforts to address conifer encroachment will help refine the location for specific priority areas to be treated.

Livestock Grazing Management

- Work cooperatively with permittees, lessees and other landowners to develop grazing management strategies that integrate both public and private lands into single management units.

D.3.2. Best Management Practices

The management practices in this section are additional practices available for consideration at the project level; BMPs are discretionary. Proponents are encouraged to apply appropriate measures to project proposals to minimize adverse impacts to Greater Sage-Grouse.

Recommendations from Scoping for BLM's National Greater Sage-Grouse Land Use Planning Strategy

Fluid Minerals

- Any oil, gas, geothermal activity will be conducted to maximize avoidance of impacts, based on evolving scientific knowledge of impacts.
- Prohibit the surface disposal of coalbed methane wastewater, as well as the construction of evaporation or infiltration reservoirs to hold wastewater. Inject coalbed methane wastewater underground into a formation of equal or lower water quality.
- Any oil, gas, or geothermal activity will be conducted to maximize avoidance of impacts, based on evolving scientific knowledge of impacts.

Fuels and Fire Management

- Monitor and control invasive vegetation in treated, burned, or restored sagebrush steppe. Rapidly restore burned or disturbed sagebrush steppe to prevent incursion of invasive plants.
- Vehicles will be washed following projects in known invasive species infestation areas.
- Design and implement fuels treatments with an emphasis on protecting existing sagebrush ecosystems.
  - Retain sagebrush canopy cover at what is expected for that ecological site, consistent with sage-grouse habitat objectives (Connelly et al. 2000; Hagen et al. 2007) unless a fuels management objective requires additional reduction in sagebrush cover to meet strategic protection of sage-grouse habitat and conserve habitat quality for the species.
  - Closely evaluate the benefits of the fuel break against the additional loss of sagebrush cover in future National Environmental Policy Act documents.
  - Apply appropriate seasonal restrictions for implementing fuels management treatments according to the type of seasonal habitats present.
  - Allow no fuels treatments in known winter range unless the treatments are designed to strategically reduce wildfire risk around or in the winter range and will maintain winter range habitat quality.
  - Do not use fire to treat sagebrush in less than 12-inch precipitation zones (e.g., Wyoming big sagebrush or other xeric sagebrush species; Connelly et al. 2000; Hagen et al. 2007; Beck et al. 2009). However, if as a last resort and after all other treatment opportunities have been explored and site specific variables allow, the use of prescribed fire for fuel breaks that would disrupt the fuel continuity across the landscape could be considered, in stands where cheatgrass is a very minor component in the understory (BLM 2012h).
  - Design post fuels management projects to ensure long term persistence of seeded or pre-treatment native plants, including sagebrush. This may require temporary or long-term changes in livestock grazing management, travel management, or other activities to achieve and maintain the desired condition of the fuels management project (Eiswerth and Shonkwiler 2006).
- Adjust grazing management in advance of predicted drought so that, to the degree possible, sagebrush habitat continues to meet sage-grouse habitat objectives. During drought periods, prioritize evaluating effects of the drought in sage-grouse habitat areas relative to their biological needs, as well as drought effects on ungrazed reference areas. Since there is a lag in vegetation recovery following drought (Thurow and Taylor 1999; Cagney et al. 2010), ensure that post-drought management allows for vegetation recovery that meets sage-grouse needs in sage-grouse habitat areas based on sage-grouse habitat objectives.

- Ensure that vegetation treatments create landscape patterns which most benefit sage-grouse. Only allow treatments that are demonstrated to benefit sage-grouse and retain sagebrush height and cover consistent with sage-grouse habitat objectives (this includes treatments that benefit livestock as part of an Allotment Management Plan [AMP]/Conservation Plan to improve sage-grouse habitat).
- Evaluate existing structural range developments and location of supplements (salt or protein blocks) to document that they conserve, enhance or restore sage-grouse habitat.
- Include sage-grouse habitat objectives in habitat restoration projects. Make meeting these objectives within occupied sage-grouse habitat the highest restoration priority.
- Design post restoration management to ensure long term Greater Sage-Grouse persistence. This could include changes in livestock grazing management and travel management, etc., to achieve and maintain the desired condition of the restoration effort that benefits sage-grouse (Eiswerth and Shonkwiler 2006).
- Avoid sagebrush reduction/treatments to increase livestock or big game forage in occupied habitat and include plans to restore high-quality habitat in areas with invasive species.
- In sage-grouse habitat, ensure that soil cover and native herbaceous plants are at their Ecological Site Description (ESD) potential to help protect against invasive plants.
- Consider potential changes in climate (Miller et al. 2011) when proposing post-fire seedings using native plants. Consider seed collections from the warmer component within a species' current range for selection of native seed (Kramer and Havens 2009).
- Establish and strengthen networks with seed growers to assure availability of native seed for restoration projects.
- Post fire recovery will include establishing adequately sized exclosures (free of livestock grazing) that can be used to assess recovery.
- Where burned sage-grouse habitat cannot be fenced from other unburned habitat, the entire area (e.g., allotment/pasture) should be closed to grazing until recovered.
- Mowing of grass will be used in any fuelbreak fuels reduction project (roadsides or other areas).

Vegetation Management

- Composition, function, and structure of native vegetation communities will meet ESD and will provide for healthy, resilient, and recovering sage-grouse habitat components.
- Avoid sagebrush reduction/treatments to increase livestock or big game forage in occupied habitat and include plans to restore high-quality habitat in areas with invasive species.
- Include sage-grouse habitat parameters as defined by Connelly et al. (2000), Hagen et al. (2007), or if available State Sage-Grouse Conservation Plans and appropriate local information in habitat restoration objectives. Make meeting these objectives within priority sage-grouse habitat areas the highest restoration preference.
- Design post restoration management to ensure long term persistence. This could include changes to livestock grazing management and travel management, etc., to achieve and maintain the desired condition of the restoration effort that benefits sage-grouse (Eiswerth and Shonkwiler 2006).
- Consider potential changes in climate (Miller et al. 2011) when proposing restoration seedings using native plants. Consider collection from warmer component of the species current range when selecting native species (Kramer and Havens 2009).

Invasive Species and Pest Management

- In sage-grouse habitat, ensure that soil cover and native herbaceous plants are at their ESD potential to help protect against invasive plants.

Travel and Transportation Management

- Limit route construction to realignments of existing designated routes if that realignment has a minimal impact on sage-grouse habitat, eliminates the need to construct a new road, or is necessary for motorist safety. Mitigate any impacts with methods that have been demonstrated to be effective to offset the loss of sage-grouse habitat.
- Use existing roads, or realignments to access valid existing rights. If valid existing rights cannot be accessed via existing roads, then, following the lek prohibitions, build any new road constructed to the absolute minimum standard necessary, and add the surface disturbance to the total disturbance. If the disturbance cap is exceeded, then make additional, mitigation that has been demonstrated to be effective to offset the resulting loss of sage-grouse habitat.
- During subsequent travel management planning, all routes within Priority Habitat would undergo a route evaluation to determine its purpose and need and the potential resource and/or user conflicts from motorized travel. Where resource and/or user conflicts outweigh the purpose and need for the route, the route would be considered for closure or considered for relocation outside of sensitive Greater Sage-Grouse habitat.
- During implementation-level travel planning, threats to Greater Sage-Grouse and their habitat would be considered when evaluating route designations and/or closures.
- During subsequent travel management planning, routes within Priority Habitat that do not have a purpose or need would be considered for closure.
- During subsequent travel management planning, routes within Priority Habitat that are duplicative, parallel, or redundant would be considered for closure.
- During subsequent travel management planning, off-highway vehicle (OHV) timing limitations would be considered in important seasonal habitats where OHV use is a threat.
- During subsequent travel management planning, consider limiting snow machine travel to designated routes or consider seasonal closures in Greater Sage-Grouse wintering areas.
- During subsequent travel management planning, routes in Priority Habitat not required for public access or recreation with a current administrative/agency purpose or need would be evaluated for administrative access only.
- During subsequent travel management planning, prioritize restoration of routes not designated in a Travel Management Plan within Priority Habitat.
- During subsequent travel management planning, consider using seed mixes or transplant techniques that will maintain or enhance Greater Sage-Grouse habitat when rehabilitating linear disturbances.
- During subsequent travel management planning, consider scheduling road maintenance to avoid disturbance during sensitive periods and times to the extent practicable. Use time of day limits to reduce impacts on Greater Sage-Grouse during breeding and nesting periods.

Livestock Grazing Management

- Reduce grazing in advance of predicted drought so that, to the degree possible, sagebrush habitat continues to meet sage-grouse habitat objectives. During drought periods, prioritize evaluating effects of the drought in sage-grouse habitat areas relative to their biological needs, as well as drought effects on ungrazed reference areas. Since there is a lag in vegetation recovery following drought (Thurow and Taylor 1999), ensure that post-drought management allows for vegetation recovery that meets sage-grouse needs in sage-grouse habitat areas based on sage-grouse habitat objectives.
- Avoid grazing and trailing within lekking, nesting, brood-rearing, and winter habitats during periods of the year when these habitats are utilized by sage-grouse.
- Any vegetation treatment plan must include pretreatment data on wildlife and habitat condition, establish non-grazing exclosures, and include long-term monitoring where treated areas are

monitored for at least three years before grazing returns. Continue monitoring for five years after livestock are returned to the area, and compare to treated, ungrazed exclosures, as well as untreated areas.

- Implement management actions (grazing decisions, AMP/Conservation Plan development, or other agreements) to modify grazing management to meet seasonal sage-grouse habitat requirements (Connelly et al. 2011). Consider singly, or in combination, changes in:
  1. Season or timing of use;
  2. Number of livestock (includes temporary non-use or livestock removal);
  3. Distribution of livestock use;
  4. Intensity of use; and
  5. Type of livestock (e.g., cattle, sheep, horses, llamas, yaks, alpacas and goats) (Briske et al. 2011).
- During drought periods, prioritize evaluating effects of the drought in priority sage-grouse habitat areas relative to their needs for food and cover. Since there is a lag in vegetation recovery following drought (Thurow and Taylor 1999; Cagney et al. 2010), ensure that post-drought management allows for vegetation recovery that meets sage-grouse needs in priority sage-grouse habitats.
- Reduce hot season grazing on riparian and meadow complexes to promote recovery or maintenance of appropriate vegetation and water quality. Utilize fencing/herding techniques or seasonal use or livestock distribution changes to reduce pressure on riparian or wet meadow vegetation used by sage-grouse in the hot season (summer) (Aldridge and Brigham 2002; Crawford et al. 2004; Hagen et al. 2007).
- In priority habitat, only allow treatments that conserve, enhance or restore sage-grouse habitat (this includes treatments that benefit livestock as part of an AMP/Conservation Plan to improve sage-grouse habitat).
- Prioritize completion of land health assessments and evaluations and processing grazing permits within priority sage-grouse habitat areas. Focus this process on allotments that have the best opportunities for conserving, enhancing or restoring habitat for sage-grouse. Utilize sage-grouse habitat objectives to conduct land health assessments to determine if standards of rangeland health are being met.
- Design any new structural range improvements to conserve, enhance, or restore sage-grouse habitat through an improved grazing management system relative to sage-grouse objectives. Structural range improvements, in this context, include but are not limited to: cattleguards, fences, enclosures, corrals or other livestock handling structures; pipelines, troughs, storage tanks (including moveable tanks used in livestock water hauling), windmills, ponds/reservoirs, solar panels and spring developments.
- Evaluate the role of existing seedings that are currently composed of primarily introduced perennial grasses in and adjacent to sage-grouse habitat to determine if they should be restored to sagebrush or habitat of higher quality for sage-grouse. If these seedings provide value in conserving or enhancing sage-grouse habitats, then no restoration would be necessary. Assess the compatibility of these seedings for sage-grouse habitat during the land health assessments.
- Evaluate existing structural range improvements and location of supplements (salt or protein blocks) to make sure they conserve, enhance or restore sage-grouse habitat.
- Design all range projects in a manner that minimizes potential for invasive species establishment. Monitor for, and treat invasive species associated with existing range developments (Gelbard and Belnap 2003; Bergquist et al. 2007).
- When developing or modifying water developments, use applicable BMPs to mitigate potential impacts from WNv (Clark et al. 2006; Doherty 2007; Walker et al. 2007b; Walker and Naugle 2011).

- Restore seedings of introduced perennial grass to sagebrush habitat where feasible, unless the seedings offer a specific purpose related to achievement of sage-grouse habitat objective. An example of a related purpose would be a seeded pasture that supports a grazing strategy beneficial to sagebrush habitat in associated pastures.

Sage-Grouse in Fire Operations and Fuels Management (BLM IM 2013-128) (BLM 2013d)

Washington Office (WO) IM 2013-128 supersedes WO IM 2011-138 (June 13, 2011) and Fire and Aviation IM 2012-017 (May 14, 2012).

Fire Operations

1. Compile district-level information into state-wide sage-grouse tool boxes. Tool boxes will contain maps, listing of READs, contact information, local guidance, and other relevant information for each district, which will be aggregated into a state-wide document.
2. Provide localized maps to dispatch offices and extended attack incident commanders for use in prioritizing wildfire suppression resources and designing suppression tactics.
3. Assign a READ with sage-grouse expertise, or who has access to sage-grouse expertise, to all extended attack fires in or near sage-grouse habitat areas. Prior to the fire season, provide training to sage-grouse READs on wildfire suppression organization, objectives, tactics, and procedures to develop a cadre of qualified individuals.
4. On critical fire weather days, pre-position additional fire suppression resources to optimize a quick and efficient response in sage-grouse habitat areas.
5. As appropriate, utilize existing fuel breaks, such as roads or discrete changes in fuel type, as control lines in order to minimize fire spread.
6. During periods of multiple fires, ensure line officers are involved in setting priorities.
7. To the extent possible, locate wildfire suppression facilities (i.e., base camps, spike camps, drop points, staging areas, heli-bases, etc.) in areas where physical disturbance to sage-grouse habitat can be minimized. These include disturbed areas, grasslands, near roads/trails or in other areas where there is existing disturbance or minimal sagebrush cover.
8. Power-wash all firefighting vehicles, to the extent possible, including engines, water tenders, personnel vehicles, and all-terrain vehicles prior to deploying in or near sage-grouse habitat areas to minimize noxious weed spread.
9. Minimize unnecessary cross-country vehicle travel during fire operations in sage-grouse habitat.
10. Minimize burnout operations in key sage-grouse habitat areas by constructing direct fireline whenever safe and practical to do so.
11. Utilize retardant, mechanized equipment, and other available resources to minimize burned acreage during initial attack.
12. As safety allows, conduct mop-up where the black adjoins unburned islands, dog legs, or other habitat features to minimize sagebrush loss.
13. Adequately document fire operation activities in sage-grouse habitat for potential follow-up coordination activities.

Fuels Management

1. Where applicable, design fuels treatment objectives to protect existing sagebrush ecosystems, modify fire behavior, restore native plants, and create landscape patterns which most benefit sage-grouse habitat.

2. Provide training to fuels treatment personnel on sage-grouse biology, habitat requirements, and identification of areas utilized locally.
3. Use burning prescriptions which minimize undesirable effects on vegetation or soils (e.g., minimize mortality of desirable perennial plant species and reduce risk of annual grass invasion).
4. Ensure proposed sagebrush treatments are planned with full interdisciplinary input pursuant to NEPA and coordination with state fish and wildlife agencies, and that treatment acreage is conservative in the context of surrounding sage-grouse seasonal habitats and landscape.
5. Where appropriate, ensure that treatments are configured in a manner that promotes use by sage-grouse.
6. Where applicable, incorporate roads and natural fuel breaks into fuel break design.
7. Power-wash all vehicles and equipment involved in fuels management activities, prior to entering the area, to minimize the introduction of undesirable and/or invasive plant species.
8. Design vegetation treatments in areas of high fire frequency which facilitate firefighter safety, reduce the potential acres burned, and reduce the fire risk to sage-grouse habitat. Additionally, develop maps for sage-grouse habitat which spatially display current fuels treatment opportunities for suppression resources.
9. Give priority for implementing specific sage-grouse habitat restoration projects in annual grasslands, first to sites which are adjacent to or surrounded by preliminary priority habitat or that reestablish continuity between priority habitats. Annual grasslands are a second priority for restoration when the sites are not adjacent to preliminary priority habitat, but within two miles of preliminary priority habitat. The third priority for annual grassland habitat restoration projects are sites beyond two miles of preliminary priority habitat. The intent is to focus restoration outward from existing, intact habitat.
10. As funding and logistics permit, restore annual grasslands to a species composition characterized by perennial grasses, forbs, and shrubs or one of that referenced in land use planning documentation.
11. Emphasize the use of native plant species, recognizing that non-native species may be necessary depending on the availability of native seed and prevailing site conditions.
12. Remove standing and encroaching trees within at least 100 meters of occupied sage-grouse leks and other habitats (e.g., nesting, wintering and brood rearing) to reduce the availability of perch sites for avian predators, as resources permit.
13. Protect wildland areas from wildfire originating on private lands, infrastructure corridors, and recreational areas.
14. Reduce the risk of vehicle- or human-caused wildfires and the spread of invasive species by planting perennial vegetation (e.g., green-strips) paralleling road ROWs.
15. Strategically place and maintain pre-treated strips/areas (e.g., mowing, herbicide application, etc.) to aid in controlling wildfire, should wildfire occur near preliminary priority habitat or important restoration areas (such as where investments in restoration have already been made).

Local Unit Fire Program

Many local units with sage-grouse habitats have established protocols that address sage-grouse and fire suppression activities. Examples of these protocols are:

Preseason:

- Ensuring that land use plans, RMPs, and fire management plans are current and include guidance for management of sage-grouse and sage-grouse habitat.

- Conducting informational meetings and workshops with federal, state, and local cooperators to share sage-grouse information such as location of habitats, BMPs for suppression activities in habitat areas, rehabilitation priorities in habitat areas, etc.
- Ensure BLM Multi-Area Coordination representatives at all levels (local, geographic, and national) understand sage-grouse issues and that it is a high agency priority.

Initial Attack:

- Ensuring that interagency fire managers update pre-planned responses within the dispatch zone to align the initial attack response with protection priorities and resource values.
- Encouraging dispatch centers to utilize Geographical Information System (GIS) maps in Wildland Fire Computer Aided Dispatch System to determine if new starts are within sage-grouse habitat or in close proximity to other identified values or assets, and relay that information to responders.
- Briefing all local initial attack crews on awareness of sage-grouse habitat during response and suppression, and ensuring they review and are familiar with BMPs.
- Ensuring out-of-area resources (severity crews, overhead, etc.) receive a full briefing, which includes (among other things) awareness of sage-grouse habitat during response and suppression, and ensuring they review and are familiar with the sage-grouse suppression BMPs.

Extended Attack:

- Ensuring field or district officers and READs are present to brief incoming incident management teams, which may be unfamiliar with sage-grouse issues.
- Ensuring READs are assigned to fires in the zone whenever fire suppression activities may affect resource values, including sage-grouse habitat.
- Ensuring READs are assigned to incidents as early as possible.
- Ensuring READs participate in annual READ workshops which address (among other things) sage-grouse concerns and BMPs.
- Ensuring READs have access to pre-built kits which include: hard copy and electronic resource information, GIS sage-grouse habitat data, fire suppression BMPs for sage-grouse, and rehabilitation guidelines.
- Ensuring sage-grouse issues are addressed throughout the Wildland Fire Decision Support System process (particularly in decision documents), and specified in delegations of authority to Incident Management Teams and Incident Commanders.
- Ensuring READs are assigned to large incidents managed by an incident management team for the duration of the incident. Ensure that, per delegations of authority, READS are included in planning meetings, firefighter briefings, and provide input to the Incident Action Plan.

Post Incident:

- Ensuring READs complete a READ Report upon demobilization of an incident. This report should summarize suppression actions, suppression damage, and damage caused by the fire itself. The READ Report should provide preliminary recommendations for stabilization, rehabilitation, and restoration and vetted by the Emergency Stabilization Rehabilitation Interdisciplinary Team prior to preparation of the Emergency Stabilization Rehabilitation Plan. This preliminary assessment (READ Report) and subsequent Emergency Stabilization Rehabilitation Plan should include impacts to sage-grouse habitat and recommendations for mitigation.

BLM National Sage-Grouse Habitat Conservation Strategy (BLM 2004b)

- Develop cooperative agreements with other land owners to maintain sagebrush patches within developed lands (housing developments, croplands, business developments etc.). Avoid the impact of construction and operations by not placing mines, oil and gas and geothermal drilling sites and facilities, roads, and mineral material disposal sites in or next to sensitive habitats such as Greater Sage-Grouse leks, nesting, early brood-rearing, breeding, and wintering habitat. When habitat loss cannot be avoided, stipulations, COAs, or mitigating measures should be developed to reduce impacts on Greater Sage-Grouse habitats.
- Whenever feasible and environmentally preferred, avoid surface occupancy by roads, livestock management facilities, well pads, powerlines, fences, or other structures adjacent to occupied leks. Signage, including Off Highway Vehicle designations, identifying and/or protecting sensitive areas should be considered. Dust abatement measures should be employed.
- Locate or construct facilities such as oil and gas compressor stations so that the noise from the station does not disturb grouse activities at the lek. Installing mufflers and baffle panels, berm the station (where invasive weeds are not an issue), or placing restrictions on how close these facilities can be located to leks, nesting and early brood-rearing habitat should be considered. New recreational facilities such as campgrounds should also be located so that the noise does not disturb grouse activities at the lek. Construction and/or maintenance should be scheduled to minimize conflicts with any known leks. Greater Sage-Grouse are sensitive to noise levels from all activities during early evening and morning hours when strutting occurs during March and April, so actions to reduce noise levels during these periods should be taken.
- Reduce habitat loss associated with mineral exploration and development by consolidating facilities as much as possible. The possibility of burying utility and flow lines beneath or along roads, centralizing tank batteries, and drilling multiple wells from a single location should be considered.
- Design and construct mineral exploration and development operations so as to disturb the smallest footprint practical on the landscape while meeting all safety requirements. Where feasible, consider mowing of parking and storage areas on portions of oil and gas well drilling locations rather than stripping the topsoil and vegetation from the entire location, and the use of two-track trails to conduct exploration activities. Minimize traffic by limiting public vehicular access in new development areas, use remote monitoring of production facilities, encourage car-pooling and the use of buses, and encourage operator-enforced speed limits to reduce dust, noise, and potential collisions with Greater Sage-Grouse so as to reduce habitat impacts. Consider using stakeless geophysical exploration activities to reduce vehicle traffic in sagebrush habitat.
- Plan and construct mining and mineral development activities, to the degree possible given State water rights, to minimize disturbances that would result in alterations to springs and riparian habitat. Greater Sage-Grouse can be impacted by the loss of surface water. Alternative water sources should be developed to replace natural sources that have been negatively affected or destroyed during these development activities. Water storage impoundments should be designed to avoid or minimize loss or degradation of Greater Sage-Grouse habitat. Water storage impoundments should be monitored and treated to prevent mosquito breeding (and the associated spread of WNv). Evaporation, reserve, work over, and production pits should also be designed with adequate fencing/netting or other protective features to reduce mortality of Greater Sage-Grouse due to drowning or entrapment.
- Carefully consider impacts to Greater Sage-Grouse and their habitats when reviewing requests for exceptions, waivers, or modifications to lease stipulations or evaluating requests for waivers of COAs.

- Evaluate land exchanges, acquisitions and disposals to determine if important Greater Sage-Grouse habitat would be impacted or whether the BLM would be acquiring important Greater Sage-Grouse habitat.
- Evaluate proposed agricultural leases, range improvements, special recreation or land use permits, and habitat improvement projects to determine if Greater Sage-Grouse and their habitats would be impacted.
- Conduct fire management activities to minimize overall wildfire size and frequency in sagebrush plant communities where Greater Sage-Grouse habitat objectives will not be met if a fire occurs. Wildfire suppression in sagebrush habitat with an understory of invasive, annual species is crucial. Prioritization of suppression actions should take into account the value and rarity of sagebrush habitat and Greater Sage-Grouse. Retain unburned areas, including interior islands and patches, of sagebrush unless there are compelling safety, private property, resource protection, or control objectives at risk. Burnout operations in areas where there are no threats to human life, private property or other important resources identified in land management plans should be minimized in crucial Greater Sage-Grouse habitats as identified in land and fire management plans.
- Annually update Fire Management Plans to incorporate new sagebrush habitat information as well as fire suppression priorities in sagebrush habitats. Objectives for the management of sagebrush ecosystems should be incorporated into Fire Management Plans and provided to initial attack personnel at the beginning of each fire season.
- Provide Fire Management Plans to the Incident Management Team. The Field Office should provide READs to assist the Incident Commander or Incident Management Teams in developing timely fire suppression priorities in crucial Greater Sage-Grouse habitat.
- Evaluate impacts on Greater Sage-Grouse habitat in areas where wildland fire use for resource benefits may be implemented. Also consider the interval since last fire, fire size and past plant community response to burning during this process.
- Establish fuels treatment projects at strategic locations to minimize size of wildfires and limit further loss of sagebrush. Fuels treatment may include the use of green-strips (strips of fire resistant vegetation) to help reduce the spread of wildfires into sagebrush communities.
- Use prescriptive livestock grazing, where appropriate, to reduce annual grass production and the spread of wildfire into sagebrush communities. Timing of grazing and effects on residual native plants need to be carefully evaluated.
- Consider removal of conifers (e.g., cutting, burning, chaining, etc.) where they have encroached upon Greater Sage-Grouse habitat. Areas of dense conifers (pinyon pine, juniper, ponderosa pine, Douglas fir) may require cutting or chaining to reestablish sagebrush plant communities (prescribed fire may not be feasible given the lack of understory and high woody fuel loads). Sites selected for cutting or chaining should have conifers that have established after the early to mid-1800s. Sites should also have evidence of past sagebrush plant communities as evidenced by residual native plants or soils that support a rangeland not a woodland ecological site. Cutting and chaining may occur as a single treatment or a preparatory treatment for prescribed burning. Post-treatment seeding will probably be required in areas where residual, herbaceous vegetation is inadequate to recover once the conifer competition is removed.
- Steps such as recontouring, respreading topsoil, revegetating all disturbed areas not needed for well or mine production, including cuts, fills, borrow ditches, and well pads up to the production facilities are suggested. Additionally, allowing room for the setup of work over rigs, and allowing future setup and parking on the top of new vegetation will minimize the need for future disturbances. The use of native species of shrubs, forbs, and grasses in seed mixes appropriate for each ecological site will also enhance habitat value or Greater Sage-Grouse.

- Evaluate (e.g., monitor) burned areas for up to three years post-fire and continue management restrictions until the recovering or seeded plant community reflects the desired condition.
- Reclaim unnecessary or redundant roads and facilities by removing surfacing material, reestablishing the original contour, spreading topsoil, and seeding to restore habitat.
- Utilize the ES&R program to apply appropriate post-wildfire treatments (livestock and/or recreation exclusion, reseeding, erosion control structures, etc.) within Greater Sage-Grouse habitat. Use of native species is encouraged dependent on cost, availability and chance for success. Seed mixtures should be designed to reestablish important seasonal habitat components for Greater Sage-Grouse.
- Install anti-perching devices on existing or new powerlines in occupied Greater Sage-Grouse habitat, or habitat identified for restoration, to minimize raptor use of these poles.
- Encourage placement of new utility developments (powerlines, pipelines, etc.) and transportation routes in existing utility or transportation corridors to minimize fragmentation of Greater Sage-Grouse habitat. If corridors do not exist, consider consolidating utility lines, pipelines, and other structures along the same new route (e.g., at one location) that least impacts sagebrush habitat.
- Place new roads where construction activity and use is concentrated and does not impact critical areas such as leks, nesting, early brood-rearing, winter habitat, riparian areas, springs and wetlands.
- Manage existing road use to decrease the level of disturbance during critical periods such as breeding (lek use) by implementing seasonal or daily use schedules, by limiting traffic volume, and/or by posting speed limits.
- Locate new structures associated with recreation (picnic areas, campgrounds, wildlife viewing sites, dispersed recreation sites, kiosks and parking lots) and livestock management facilities (corrals, water pipelines and tanks/troughs, exclosures, etc.) away from crucial breeding, brood-rearing and winter areas; or manage disturbance with seasonal or daily timing restrictions. Construction of recreational-related facilities (kiosks, toilets, signs, etc.) that provide avian perches should be avoided unless they include mitigating features such as perch guards. Manage use at established structures/developments to reduce impacts to Greater Sage-Grouse during critical periods of their life cycle.
- Design and locate the placement of fences for livestock, wildlife, recreation and developed site protection so as not to disturb important Greater Sage-Grouse habitat areas. Impacts of livestock congregation against fences and its effect on Greater Sage-Grouse habitat near leks, nesting, and wintering areas should be considered.
- Design wind energy facilities to reduce habitat fragmentation and mortality to Greater Sage-Grouse. Tubular tower designs to reduce raptor perches and noise reduction to minimize disturbance to nesting birds are encouraged. Design criteria for these projects should include minimizing the facility footprint (including the road network required to service the generators) in Greater Sage-Grouse habitat. BMPs for wind energy are currently being developed in the Wind Energy Programmatic EIS. The BMPs that address the conservation of Greater Sage-Grouse and their habitat are adopted by reference.
- Manage dispersed recreation activities like hiking, mountain biking, and horseback riding to minimize impacts to vegetation and Greater Sage-Grouse in sensitive Greater Sage-Grouse habitat areas. Keeping these users on established trails will minimize impacts to Greater Sage-Grouse habitat and activities.
- Consider seasonal closures to protect priority Greater Sage-Grouse habitat if other alternatives will not achieve desired objectives.
- Reclaim unused roads and facilities by reseeding sagebrush, shrubs, and native grasses and forbs to help improve Greater Sage-Grouse habitat and reduce weed invasion.

- Encourage vegetative restoration along roads, ROWs, on well pads, and at existing facilities where habitat needs for Greater Sage-Grouse are not currently met.
- Require successful seeding of appropriate vegetation on any new disturbance associated with mineral and energy facility developments, livestock management facilities, and recreation facilities.
- Restore small areas dominated by invasive species with desirable vegetation to minimize fragmentation of habitat.
- Where good habitat quality exists, maintain current management practices considering plant composition and soil type.
- Use grazing practices that promote the growth and persistence of native shrubs, grasses and forbs needed by Greater Sage-Grouse for seasonal food and concealment. Vegetation structure (height) should be managed so as to provide adequate cover for Greater Sage-Grouse during the nesting period.
- Change mineral supplement and/or watering locations to move domestic livestock to desired areas. However, any change in location of supplement or watering location should consider potential effects to Greater Sage-Grouse habitat.
- Coordinate with state wildlife agencies where wildlife use detrimentally affects Greater Sage-Grouse habitat quality.
- Construct and maintain water developments at key locations in Greater Sage-Grouse habitat. Install or retrofit water developments with wildlife escape ramps.
- Maintain seeps, springs, wet meadows, and riparian vegetation in a functional and diverse condition for young Greater Sage-Grouse and other species that depend on forbs and insects associated with these areas. Consider fencing if vegetation associated with these wet areas cannot be maintained with current livestock or wildlife use and the impacts of the fence are outweighed by the improved habitat quality.
- Maintain sagebrush and understory diversity (relative to site potential) adjacent to crucial seasonal Greater Sage-Grouse habitats unless such removal is necessary to achieve Greater Sage-Grouse habitat management objectives.
- Encourage the use of insecticide baits and natural pathogens instead of broad-spectrum insecticides where insect control is required. Improper use of pesticides to control insect outbreaks can result in a reduction of food resources for Greater Sage-Grouse, particularly nesting females and chicks. While the Animal and Plant Inspection Service is responsible for controlling these insects on public lands, the BLM should recommend avoidance areas as well as the type of treatment. Target pest control toward key problem areas, and schedule applications to be effective in minimum doses. Broadcast spraying should generally be avoided in favor of ground applications to minimize drift into non-target areas. Avoid applying pesticides to Greater Sage-Grouse breeding habitat during the brood-rearing season (mid-May through mid-July) to reduce the loss of food supply to chicks and avoid the chance of secondary poisoning.
- Grazing use should be adjusted during extended drought periods. Consider transitioning back to pre-drought use when drought conditions have ended.
- Reduce the density of conifers that have encroached into but do not yet dominate sagebrush plant communities. Site selection should be based on proximity to occupied habitat, site potential, herbaceous invasive species, or other factors that affect the potential for sagebrush plant communities to be reestablished.
- Where other grazing management options are not achieving, or cannot achieve, the desired objectives, a short-term option may be livestock exclusion.
- Restore lost riparian and wetland plant species diversity and structure by replanting appropriate species near crucial Greater Sage-Grouse habitat.

- Treatments should be designed to improve a deficient condition within the community (e.g., poor cover of herbaceous understory).
- Reintroduction of appropriate fire regimes will help to limit conifer encroachment into the sagebrush plant communities. Prioritization of areas to be burned or mechanically treated should take into account invasive herbaceous species, fire regime, and condition class (measure of departure from historic fire regime). A balance should be achieved between treating areas that have significantly departed from historic fire regime (condition class 3) and areas that are functioning within an appropriate fire regime (condition class 1).
- Seeding may be required in areas where residual perennial vegetation is insufficient to respond following prescribed burning. Minimize seeding with non-native species that may create a continuous perennial grass cover and restrict reestablishment of native vegetation. However, non-native seed may be appropriate on severely degraded sites if native species would not be successful or are not available.
- Evaluate all wildfires in known Greater Sage-Grouse habitat to ensure that the appropriate plant species are reseeded relative to site potential and seasonal Greater Sage-Grouse habitat requirements. Emphasize the use of native species in these seed mixtures and minimize the use of introduced grasses. Make burned Greater Sage-Grouse habitats a high priority for restoration if funds are limited in the ES&R Program. If native plant seed is scarce, assign a priority that this seed be reallocated to ES&R projects in critical Greater Sage-Grouse habitat areas. Seeding of non-native species may be necessary in areas where invasive plants dominate or have the potential to dominate the post-fire plant community.
- BMPs for this species identified in Grazing Influence, Objective Development, and Management in Wyoming's Greater Sage-Grouse Habitat as Grazing Management Recommendations include the following:
  - Avoid any new sources of disturbance such as range improvements on leks sites. Identify the location of leks through consultation with local biologists to provide appropriate emphasis.
  - Maintain the Sagebrush/Bunchgrass Plant Community wherever currently present. Manage for high vigor in all plant communities. Avoid repeatedly using cool-season bunchgrass in the critical growing season and limit utilization to moderate levels to assure that the previous year's standing crop is available for hiding cover.
  - Avoid repeatedly grazing riparian areas in seasons when temperatures are high.
  - Avoid levels of browsing on sagebrush that would limit Greater Sage-Grouse access to their food supply and cover. Additionally, avoid heavy use of herbaceous standing crop as this will adversely affect hiding cover the following spring.
  - Carefully consider changes in management that would increase utilization or change the timing of grazing on bunchgrass community sites.
  - Avoid confining animals on inadequate pasture or supplemental feeding to compensate for a lack of natural forage.
  - Restrict grazing in conjunction with restoration efforts until the site is ready to sustain grazing.

Northeast Wyoming Sage-Grouse Conservation Plan (NWSGLWG 2006)

- **Road Building Maintenance and Usage**
  1. Work cooperatively with all involved permittees, lease holders or field operators, and affected landowners, develop a road use and travel plan for areas within 3 miles (5 kilometers [km]) of sage-grouse leks (Connelly et al. 2000).
  2. Coordinate planning among all companies operating in the same field and strongly encourage everyone involved to follow the same road use plan.

3. Map all existing and proposed roads for areas to be developed, and consolidate activities using existing roads and other facilities where possible.
4. Minimize the number of vehicles per visit, and the number of roads used within the area.
5. Encourage remote monitoring of production sites to minimize road use and reduce harassment of birds during critical seasons (breeding, nesting, brood-rearing, and winter).
6. Allow traffic at most, only every other day, less frequently if possible.
7. Limit traffic on all roads to three, one-hour travel periods per day spaced at least two hours apart.
8. Establish acceptable stopping points and "drive through only" areas.
9. Sign roads as appropriate to prevent off-road travel and to inform all users of the roads of acceptable use times and approved stopping areas.
10. As appropriate, gate and close all newly constructed (project related) roads to public travel.
11. Consider using pipelines to bring product to a central facility to reduce needed number of roads and traffic.
12. Minimize visual/auditory impacts where practicable (e.g., place roads below ridgelines or along topographic features).
13. Place roads outside of riparian areas where possible.
14. If avoidance is not possible, minimize impacts to riparian, wetland, or wet meadow habitats to limit impacts to brood rearing areas. (exploration, drilling, production and operations).
15. Avoid placement of well pads, roads and other well field facilities on mapped winter habitats, or within a 1/8-mile (200 meter) buffer surrounding winter habitat.
16. Encourage road rehabilitation or realignment to minimize impacts to sage-grouse.
17. Select sites for construction that will not disturb suitable nest cover or brood-rearing habitats within 3 miles (5 km) of occupied leks, or within identified nesting and brood-rearing habitats outside the 3-mile (5 km) perimeter (Connelly et al. 2000).
18. Utilize minimum construction and maintenance standards appropriate for the operation.
19. Establish acceptable times for road construction and maintenance that will minimize disturbance during critical seasonal use periods.
20. Reclaim roads that are only needed periodically, and allow operators to drive over reclaimed roads when needed.

- **Powerline Construction and Maintenance**
  1. Working cooperatively with all involved permittees, lease holders or field operators to develop a master powerline plan for all areas within 3 miles (5 km) (Connelly et al. 2000) of sage-grouse leks and on other identified sage-grouse habitats.
  2. Where feasible, bury new powerlines.
  3. Map all existing and proposed powerlines for the area, consolidating new powerlines into existing disturbance corridors.
  4. Coordinate planning and powerline needs among companies operating in the same field.
  5. Include powerline access roads in the road use and travel plan to include power companies in appropriate use times.
  6. Select sites for construction that will not disturb suitable nest cover and brood-rearing habitats within 3 miles (Connelly et al. 2000) of a lek.
  7. Select sites for construction that will not disturb wintering habitat.
  8. Locate any above-ground powerlines off of ridges and out of riparian areas (1,000 feet (300 meters) riparian buffer where feasible).
  9. Direct powerline construction (above or underground) to areas of existing disturbance corridors (i.e., existing roads, railroads, powerlines, etc.).
  10. Recommend the lowest voltage powerline needed for the project while considering future needs.

11. Reduce existing above ground powerlines by burying them as opportunities (such as rebuilds) arise.
    a. If burying powerlines cannot be accomplished, install perch guards to prevent raptor use.
    b. Recommend onsite power generation to minimize overhead power lines.
    c. Visibility markers should be included on above ground lines in high avian use areas such as across drainages, water bodies, prairie dog colonies, etc.

- **General Mineral Development**
  1. Evaluate and address the needs of sage-grouse when placing well sites, mines, pits and infrastructure. Develop a plan for roads, pipelines, etc. to minimize impacts to sage-grouse.
  2. Consider developing travel management plans that would allow seasonal closure of roads for all but permitted uses (i.e., recreation and hunting) and encourage the reclamation of unnecessary or redundant roads.
  3. Where mineral development occurs in sage-grouse habitat, tailor reclamation to restore, replace or augment needed habitat types.
  4. Where necessary to build or maintain fences, evaluate whether increased visibility, alternate location, or different fence design will reduce hazards to flying grouse.
  5. Avoid construction of overhead lines and other perch sites in occupied sage-grouse habitat. Where these structures must be built, or presently exist, bury the lines, locate along existing utility corridors or modify the structures to prevent perching raptors, where possible.
  6. Reduce noise from industrial development or traffic, especially in breeding and brood rearing habitats.
  7. Manage water production to enhance or maintain sage-grouse habitat.
  8. Avoid surface and sub-surface water depletion that impacts sage-grouse habitats.
  9. Consider an exception or waiver of seasonal stipulations if technologies that significantly reduce surface disturbance are used.
  10. Control dust from roads and other surface disturbances within the population's seasonal habitats.
  11. Continue research efforts to determine the effects of mineral development on sage-grouse populations.
  12. Consider offsite mitigation as an alternative mitigation for mineral development impacts on known sage-grouse habitat. Work with mineral entities to develop and implement acceptable offsite mitigative measures for enhancing sage-grouse or habitat, as needed, to offset impacts of surface-disturbing activities.
- **Oil and Gas Development and Sand and Gravel Mining**
  1. As a general rule, do not drill or permit new or expand existing sand and gravel activities within 3 miles (5 km) (Connelly et al. 2000) of active leks between March 1st and July 15th. As seasonal habitat mapping efforts are completed, re-direct efforts towards protecting nesting habitat. (Dates and distances of agency proposed action will be used.)
  2. Avoid surface disturbance or occupancy on or within 0.25 mile of known active lek sites. (Distances of agency proposed action will be used.)
  3. Evaluate well spacing and location requirements under Wyoming Oil and Gas Conservation Commission jurisdiction in light of sage-grouse habitat needs and consider spacing exceptions that protect habitat. The limitations of obtaining spacing exceptions must be recognized.
  4. To minimize disturbance during the breeding season, avoid human activity within 0.25 mile of occupied sage-grouse leks. (Dates and distances of agency proposed action will be used.)
  5. Where technically and economically feasible, use directional drilling or multiple wells from the same pad.

6. Where facilities are developed within sage-grouse habitat, minimize potential use by predators (i.e., raptor proof power poles, eliminate crawlspaces under buildings).
7. Encourage the development of new technologies that would reduce total surface disturbance within occupied sage-grouse habitat (i.e., directional drilling, multiple wells from the same well pad and reinjection of produced water).

- **Vegetation Management**
  1. Develop priorities and implement habitat enhancements in areas currently occupied by sage-grouse.
  2. Develop priorities and implement habitat enhancements in historical or potential sage-grouse habitats.
  3. Develop and implement wildfire suppression guidelines that address sage-grouse habitat health and management.
  4. Remove juniper and other conifers where they have invaded sagebrush sites important to sage-grouse.
  5. Ensure vegetation treatments and post-treatment management actions are appropriate to the soil, climate, and landform of the area.
  6. Recognize that fire provides a natural diversity component in sagebrush habitats; manage fire on a landscape and patch scale at a local level.
     a. Use prescribed fire to maintain, enhance or promote sagebrush ecosystem health by mimicking natural fire frequencies.
     b. Where sage-grouse are present or desired, fire management objectives should recognize that fire generally burns the better sage-grouse nesting and severe winter habitat.
     c. Evaluate all wildfires greater than 40 acres in occupied sage-grouse habitat to determine if rehabilitation of the burned area is needed with emphasis placed on habitats that would be susceptible to invasion by annual grasses.
  7. When rehabilitation is necessary, the first priority is protection of the soil resource. Use appropriate mixtures of sagebrush, native grasses, and forbs that permit burned areas to recover to a sagebrush-perennial grass habitat.
  8. Grazing management following sagebrush treatments or manipulations should be designed to benefit long-term sagebrush diversity and ecosystem health. Grazing management strategies should be designed to permit reestablishment of native sagebrush, grasses, and forbs that benefit sage-grouse.
  9. Experiments in habitat manipulation should be relatively small in comparison to a specific sage-grouse population.
  10. Determine threshold levels of habitat alteration that can occur without negatively impacting specific sage-grouse populations. As a general rule, treat no more than 20 percent of any seasonal habitat type until results are evaluated.
  11. Treat sagebrush in patches rather than contiguous blocks.
  12. Protect patches of sagebrush within burned areas from disturbance and manipulation.
  13. Consider all alternatives when designing sagebrush treatments.
  14. Additional treatments in adjacent areas should be deferred until the previously treated area again provides suitable sage-grouse habitat.
  15. Avoid removing sagebrush adjacent to sage-grouse foraging areas along riparian zones, meadows, lake beds and farmland unless such removal is necessary to achieve habitat management goals.
  16. Use mechanical or other appropriate treatments such as herbicides in areas with relatively high shrub cover (>30%) and a poor herbaceous component in order to improve brood-rearing habitats.

17. Implement effective monitoring plans to determine the effectiveness of vegetation treatments.
18. Develop and maintain cumulative records for all vegetation treatments to determine and evaluate site specific and cumulative impacts to sage-grouse habitats and identify recommended management practices for successful vegetation treatments.

- **Invasive Plants**
  1. Identify invasive plants of concern in sage-grouse habitats.
  2. Map areas where invasive plants of concern already exist.
  3. Implement strategies to assist in prevention of the spread of noxious weeds or invasive plants detrimental to sage-grouse.
  4. Prioritize and aggressively treat invasive plants in identified areas of concern.
  5. Employ appropriate site preparation techniques and timely reseeding with approved seed mixes of any disturbed areas to prevent encroachment of invasive plants.
  6. Maintain cumulative records for invasive plants treatment and prevention programs to evaluate site specific and cumulative impacts to sage-grouse habitats.
- **Land Use**
  1. Encourage assimilation of sage-grouse information into plans as they are developed. Develop and distribute appropriate literature.
  2. Limit free-roaming dogs and cats.
  3. Maintain appropriate stocking rates of livestock.
  4. Encourage cluster development, road consolidation and common facilities that would have a reduced impact on sage-grouse.
  5. Where necessary to build or maintain fences, evaluate whether increased visibility, alternate location, or different fence design will reduce hazards to flying grouse.
  6. Maintain healthy sagebrush communities.
  7. Plan development to allow for sage-grouse movement.
  8. Where possible protect habitat through conservation (i.e., land exchanges, conservation easements, leases or Conservation Reservation Program type programs).
  9. Locate and manage facilities to eliminate predator impacts to sage-grouse.
  10. Provide education on the effects of development on sage-grouse habitat and populations. Facilitate conservation districts and extension agents' ability to educate the public about sage-grouse.
  11. Consider developing travel management plans that would allow seasonal closure and reclamation of roads.
  12. Reduce noise from industrial development or traffic especially in breeding and brood rearing habitats.
  13. Avoid construction of overhead lines and other perch sites in occupied sage-grouse habitat. Where these structures must be built, or presently exist, bury the lines, locate along existing utility corridors or modify the structures in key areas (priority habitat).
  14. Control dust from roads and other surface disturbances.
- **Parasites and Diseases**
  1. Investigate and record deaths that could be attributed to parasites or disease.
  2. Develop and implement strategies to deal with disease outbreaks where appropriate.
  3. Implement pond design standards to minimize mosquito breeding habitat.
     a. Overbuild the size of ponds to accommodate a greater volume of water than is discharged. This will result in non-vegetated and muddy shorelines that breeding mosquitoes avoid.

b. Build steep shorelines to reduce shallow water and aquatic vegetation around the perimeter of impoundments. Construction of steep shorelines also will increase wave action that deters mosquito production.
c. Maintain the water level below that of rooted vegetation for a muddy shoreline that is unfavorable habitat for mosquito larvae. Rooted vegetation includes both aquatic and upland vegetative types. Always avoid flooding terrestrial vegetation in flat terrain or low lying areas.
d. Construct dams or impoundments that restrict down slope seepage or overflow. Seepage and overflow results in down-grade accumulation of vegetated shallow water areas that support breeding mosquitoes.
e. Line the channel where discharge water flows into the pond with crushed rock, or use a horizontal pipe to discharge inflow directly into existing open water, thus precluding shallow surface inflow and accumulation of sediment that promotes aquatic vegetation.
f. Line the overflow spillway with crushed rock, and construct the spillway with steep sides to preclude the accumulation of shallow water and vegetation.
g. Fence pond sites to restrict access by livestock and other wild ungulates that trample and disturb shorelines, enrich sediments with manure and create hoof print pockets of water that are attractive to breeding mosquitoes.

- **Predation**

  Predation recommended management practices on public lands would only be implemented in coordination with U.S. Department of Agriculture (USDA) Wildlife Services.

1. Predator control may be warranted to maintain or enhance local sage-grouse populations when there is a demonstrated need such as a population is trending downward over a 3-year period; populations of "newcomer" predators are artificially high in sage-grouse habitat; specific sage-grouse populations need short-term help.
2. Develop and distribute educational materials regarding human practices that may allow establishment/expansion of predator populations. Examples of these activities include landfills and other garbage/waste disposal that may provide artificial food sources for a variety of predators, and buildings/structures that provide nesting/roosting habitat for ravens/raptors.
3. Avoid construction of overhead lines and other perch sites in occupied sage-grouse habitat. Where these structures must be built, or presently exist, bury the lines, locate along existing utility corridors or modify the structures in key areas.
4. Predator control to enhance sage-grouse survival should be targeted only predators identified as impacting that sage-grouse population.
5. Better quantify and qualify the role of predation on sage-grouse in Wyoming.
6. Discourage the establishment, and bring into balance artificially high populations of “newcomer” predators in sage-grouse habitat.
7. Monitor the effectiveness of any predator control efforts that are implemented.

- **Livestock Grazing Management**

1. In interactions between wildlife professionals, livestock producers and other interested parties, employ tolerance and understanding, and respect other perspectives. Focus on areas of mutual interest.
2. Evaluate effects of different grazing treatments on sage-grouse productivity, survival, and habitat use.
3. Actively educate stakeholders about grazing strategies that can be used to improve or maintain sage-grouse habitats. Cooperate to create and distribute a Wyoming guide to enhancing sage-grouse habitat.

4. In general, avoid yearlong and spring-to-fall continuous grazing schemes in sage-grouse habitat. Yearlong and spring-to-fall grazing may be a tool if it is not continued each year.
5. Where appropriate, implement livestock grazing systems that provide for areas and times of rest or deferment.
6. Where practicable, avoid heavy utilization of grazed pastures to compensate for rested pastures (a year of rest cannot compensate for a year of excessive use).
7. Design grazing systems that provide sage-grouse habitat in riparian areas and around water sources.
8. During periods of forage drought, utilize grazing schemes that reduce impacts to sage-grouse (e.g., adjust intensity, timing and/or duration of grazing).
9. Investigate the possibility of developing forage banks for use during periods of drought to alleviate inappropriate use by grazing animals on sage-grouse habitat.
10. Reduce disturbance to sage-grouse habitat from livestock management activities (e.g., salting or mineral placement, turnout or gathering, bed ground/camp locations, etc.)
11. Develop and implement management plans for grazing that take into consideration the seasonal sage-grouse habitat needs. These management plans could include a variety of grazing systems designed to reach habitat goals, including short-duration, rest rotation, etc.
12. Look for ways to minimize negative impacts and enhance sage-grouse habitat when establishing livestock range improvement projects (e.g., water overflow for sage-grouse from water developments, placement of fences, facilities that provide raptor perch sites, construction of roads, salt grounds).
13. Avoid human activity near leks during the breeding season between the hours of 8 p.m. to 8 a.m.
14. Except for livestock guard dogs, avoid allowing dogs to run unchecked in sage-grouse habitats.
15. Experiment with types of grazing to improve sage-grouse habitat accompanied by monitoring to determine effects on sage-grouse.
16. Use techniques such as increased visibility, alternate location, or different design to build and maintain fences that are not hazards to flying grouse.
17. During the breeding season (March 1st through May 15th), use sheep bedding grounds at least 0.5 mile from leks. Should herding practices regain popularity, herders should attempt to avoid disturbing occupied leks with their sheep bands, once they leave the bed ground and begin their daily movements.
18. During the breeding season (March 1st through May 15th), reduce physical disturbance to breeding sage-grouse by placing salt or mineral supplements beyond 0.25 mile of lek locations.
19. In suitable nesting habitats within 3 miles of leks, design grazing systems to manage for residual herbaceous vegetation to provide cover for nesting sage-grouse hens. Options to promote herbaceous cover include:
    a. When circumstances allow, shift early-season livestock use to pastures with minimal, or no, potential for nesting (e.g., pastures lacking sagebrush, exotic grass seedings, annual grasslands, etc.).
    b. When pastures with potential nesting habitat are grazed early in the season, use an appropriate stocking rate when herbaceous plants are not rapidly growing (generally prior to late-April). Options for monitoring grazing can be found in the Wyoming Rangeland Monitoring Guide.
20. Manage stocking rates and rotations to maintain the health and productivity of rangelands for livestock and sage-grouse. Incorporate one of the monitoring programs from the

Wyoming Rangeland Monitoring Guide to ensure proper grazing utilization and plant recovery.

21. If your goal is to increase production of grasses and forbs, manage for increased soil water intake by promoting residual vegetation and mulch through implementation of light grazing intensities.
22. In pastures with riparian habitats (assuming riparian vegetation is actively growing), manage livestock grazing to allow herbaceous vegetation recovery.
23. Supplemental winter-feeding of livestock in occupied sage-grouse winter habitats should be avoided for both sheep and cattle operations to prevent over-utilization of sagebrush resources by sheep and trampling damage by cattle.
24. Utilization of sagebrush plants should not exceed 20 percent by livestock and big game.
25. Placement of new fences and structures should include consideration of their impact on sage-grouse. In general, avoid constructing fences within 0.5 mile of leks. Avoid locating fences in swales and on ridge tops. Minimize fence height and maximize bottom wire height to the extent possible. In areas with documented collisions make fences as visible as possible, (e.g., wire markers, use white-topped steel fence posts, use wooden stays and/or reduce spacing between fence posts, etc.).
26. Where feasible, place new, taller structures such as corrals, loading facilities, water storage tanks, windmills, etc. at least 0.5 mile from leks to reduce opportunities for perching raptors.
27. New spring developments in sage-grouse habitat should be designed to maintain or enhance the free-flowing characteristics of springs and wet meadows with the use of float valves on troughs or other features where feasible. Spring and wet meadows should be protected from over utilization and trampling by livestock.
28. Equip new and existing livestock troughs and open water storage tanks with ramps to facilitate the use of, and escape from, troughs by sage-grouse and other wildlife.

- **Weather**
  1. Where drought has been documented for two consecutive years, consider implementation of Recommended Management Practices in year three that may include:
     a. Drought management of livestock and wildlife grazing.
     b. Protection of critical sage-grouse habitats from wildfire and prescribed fire.
     c. Reduced bag limits during sage-grouse hunting seasons. (not within BLM management authority)
     d. Predator management programs to enhance nesting and early-brood-rearing success of impacted populations. (would only be implemented in coordination with USDA Wildlife Services when a need has been determined.)
     e. Water hauling and protection of water sources from evaporation.
     f. Installation of guzzlers, snow fences and fencing of water source overflows.
     g. Insure wildlife escape ramps are in place on existing water sources.
     h. Implement other appropriate management options developed by local sage-grouse working groups.
- **Coal Exploration, Mining, and Reclamation**
  1. Evaluate and address the needs of sage-grouse when siting mines, and mining related infrastructure. Impacts to sage-grouse should be minimized where practicable.
  2. Tailor reclamation to replace or augment sage-grouse habitat to the extent practicable in instances where such habitat is adversely affected.
  3. Evaluate fence design, location and visibility to reduce hazards to flying grouse.
  4. Manage water production to enhance or maintain sage-grouse habitat.
  5. Control dust from roads.

6. Control mosquito larvae, to the extent practicable and feasible, in mine-related surface water impoundments.
7. Install wildlife escape ramps in mine reclamation-related livestock watering facilities (tanks).
8. Continue sage-grouse and sage-grouse habitat-related research and monitoring efforts.
9. Remove only that amount of topsoil necessary to support continued mining operations on an annual basis or otherwise manage topsoil removal operations to minimize the impact on sage-grouse.
10. Consider alternative mitigation measures for mining impacts on known sage-grouse habitat. This may include, but not be limited to, implementing offsite mitigative measures for enhancing sage-grouse habitat to offset the temporary impacts of coal mine surface-disturbing activities.
11. When feasible and practicable, new or expanded exploration within two miles of active leks should occur prior to March 15th or after July 15th. Following initiation of mining (i.e., topsoil removal) this recommendation will not be applicable.
12. When feasible and practicable, plan to avoid new surface occupancy or disturbance activities on or within 0.25 mile (400 meters) of the perimeter of known active lek sites from March 1 to May 15. Following initiation of mining (i.e., topsoil removal) this recommendation will not be applicable. (Active coal mines are located outside of priority habitat.)
13. Continue the effort to establish Wyoming big sagebrush to meet shrub density requirements.

- **Other Solid Mineral Mining Operations**
  1. When feasible, new or expanded exploration and/or mining activities within 3 miles (5 km) (Connelly et al. 2000) of active leks should be avoided between March 1st and July 15th. Following initiation of mining (i.e., topsoil stripping) this recommendation would not be applied. As seasonal habitat mapping efforts are completed, re-direct efforts towards protecting nesting habitat.
  2. When feasible, plan to avoid new surface occupancy or disturbance activities within 3 miles (5 km) (Connelly et al. 2000) of the perimeter of known active lek sites from March 1 to May 15.
  3. Where sage-grouse are present or desired, avoid human activity adjacent to leks during the breeding season between the hours of 8 p.m. and 8 a.m.
- **Pesticides**
  1. Determine the extent of pesticide use within sage-grouse habitats.
  2. Examine what, if any, effects each pesticide use may have on sage-grouse populations.
  3. Where possible, adjust management instead of applying pesticides.
  4. Make use of current laboratory analysis procedures where sage-grouse mortality is observed. Report where pesticides have caused mortality in sage-grouse.
  5. Determine which pesticides and application strategies are least harmful to sage-grouse.
  6. Research effects of pesticides on sage-grouse in Wyoming with a specific goal of testing impacts of actual rangeland applications.
  7. Work with county Weed and Pest Districts to identify low-toxicity alternatives to pesticides classified as a medium to very high risk to game birds.
  8. Assist in providing Wyoming retail dealers, Weed and Pest Districts, and county extension agents with information intended for users regarding product toxicity levels to sage-grouse, and alternatives that are effective while less toxic.
  9. Encourage simple, standardized record-keeping formats, and allow access to pesticide use information.
  10. Address grasshopper issues using Reduced Agent Area Treatments approach.

11. Avoid broadcast spraying during the nesting season, March 1 to July 15, within three miles of a sage-grouse lek site.

- **Recreation**
  1. Develop travel management plans and enforce existing plans.
  2. Restrict off-road-vehicle use in occupied sage-grouse habitats.
  3. Avoid recreational activities in sage-grouse nesting habitat during the nesting season.
  4. Restrict permitted organized recreational activities between March 1 and July 15 within 3 miles (5 km) (Connelly et al. 2000) of a lek site.
  5. Recreational facilities shall be located at least 3 miles (5 km) (Connelly et al. 2000) from lek sites and in areas that are not in crucial sage-grouse habitat.
  6. In coordination with the WGFD, establish and maintain a small number of lek viewing sites and minimize viewing impacts on these sites. Viewing sage-grouse on leks (and censusing leks) should be conducted so that disturbance to birds is minimized or preferably eliminated.
  7. Do not provide all lek locations to individuals simply interested in viewing birds.
  8. Develop and provide information related to recreation and its impacts on sage-grouse habitat.
  9. Discourage dispersed camping within important riparian habitats occupied by sage-grouse during late summer.
  10. Avoid construction of overhead lines and other perch sites in occupied sage-grouse habitat. Where these structures must be built, or presently exist, bury the lines, locate along existing utility corridors or modify the structures in key areas.
  11. Control dust from roads and other surface disturbances.
  12. Inform the public that dog training on sage-grouse outside the hunting season is wildlife harassment and therefore illegal.

Northeast Wyoming Sage-Grouse Working Group: Recommendations for Development Within Connectivity Corridors (NWSGLWG 2010)

1. Encourage the suspension of federal and state leases in the connectivity corridors where mutually agreed to by the leasing agency and the operator. These suspensions should be allowed until additional information clarifies their continued need. Where suspensions cannot be accommodated, or at the option of the operator, limit disturbance to no more than 5 percent (up to 32 acres) per 640 acres of suitable Greater Sage-Grouse habitat within connectivity corridors.
2. Carefully plan developments to avoid or minimize fragmentation of sagebrush habitats in connectivity corridors. The Northeast Wyoming Sage-Grouse Working Group expects industry, BLM and WGFD to work closely together to minimize the overall acreages disturbed with efficient road and well pad designs to avoid excessive engineering and size of pads. BLM should especially be judicious in its application of Gold Book Standards within connectivity corridors using minimum standards whenever possible.
3. The Northeast Wyoming Sage-Grouse Working Group recognizes that reducing human disturbance during the breeding season is beneficial for sage-grouse within important habitats in connectivity corridors. The Northeast Wyoming Sage-Grouse Working Group recommends that a Controlled Surface Use buffer of 0.6 mile around leks or their documented perimeters and a March 15 – June 30 Timing Limitation Stipulation (TLS) be required within nesting habitat within 4 miles of leks. These stipulations will be followed regardless of surface or mineral ownership.

4. Utility providers will work closely with State and Federal agencies to ensure that new distribution powerlines are sited with consideration for sage-grouse habitat within connectivity corridors. Eliminate or minimize the use of overhead powerlines after power is delivered ("dropped") to the development by the utility company. Electrical, gas and water lines should be constructed outside of sage-grouse habitat. Within sage-grouse habitat, consolidate these utility lines within a common corridor. Utility providers will work closely with WGFD, landowners and land management agencies to ensure that source lines are sited with consideration for sage-grouse habitat. Energy companies will be encouraged in the COAs in their plans of development to request overhead powerlines be immediately retired after they are no longer needed for development of minerals. Alternatives to overhead power will be investigated if the landowner requests the powerline to remain for developing water wells for livestock or wildlife.
5. Water reservoirs for Coalbed Natural Gas produced water or other uses may provide habitat for mosquitoes, which spread WNv, promote habitat for newcomer predators (e.g., red fox, raccoon and striped skunk) and occupy acreage that would otherwise be suitable for sage-grouse. Water management will minimize reservoir use. The Northeast Wyoming Sage-Grouse Working Group encourages treatment and discharge into perennial streams, reinjection or other nonsurface discharge options within connectivity corridors.
6. With an effort led by the Governor's office or other agencies, develop a comprehensive larvicide program to manage mosquitoes for all waters within the connectivity corridor. This will include pre and post treatment monitoring to document presence of the primary WNv vector (*Culex tarsalis*) and determine efficacy of the treatment program.
7. Energy operators should use telemetry systems to remotely monitor system performance and safety issues. Non-emergency visits will observe timing restrictions during the TLS window, avoiding sunrise/sunset time periods when grouse are most active and obey conservative speed limits. Minimize noise levels and locations of compressors and generators within connectivity areas.
8. Require the use of site specific and beneficial seed mixtures for sage-grouse on interim and final reclamation. Reference ESDs from NRCS or other professional service. Allow for spring seeding exceptions from TLS to ensure that forb species are planted during optimum precipitation periods (e.g., spring). Promote the inclusion of sagebrush seeds in final reclamation efforts.
9. The Northeast Wyoming Sage-Grouse Working Group encourages landowners within connectivity corridors to consider participation in USDA/NRCS conservation programs for sage-grouse and other wildlife. These efforts should be further supported by industry, Conservation Districts, and State and Federal agencies wherever possible by promoting participation, sponsoring education opportunities and cost sharing programs.
10. All stakeholders need to be vigilant in identifying invasive weed establishment, treating them appropriately and preventing further spread by routine washing of vehicles and equipment.
11. The WGFD will coordinate monitoring in connectivity corridors including:
    - lek counts and surveys;
    - perform genetic analyses using DNA from collected feathers, blood samples, etc.;
    - monitor a radio-marked sample of sage-grouse in this area for seasonal habitat use and assess the role that WNv may have in annual mortality rates.
12. Coordinate response to range fires in sagebrush habitats with respective counties and other appropriate agencies. Sagebrush habitats should receive a priority response.

Appendix E. Livestock Grazing Allotments

E.1. Livestock Grazing Allotments within the Buffalo Planning Area

Table E.1. Current Livestock Grazing Allotment Information

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Permitted Use (AUMs)
12182	4mile Creek/RC	C	369		41
02378	76 Creek	C	200		33
02314	Adon	C	40		6
22115	Allemandll	C	1,520		184
02246	Anderson Draw	C	178		21
12173	Antelope Basin	C	449		47
02366	Antelope Draw	C	40		6
02493	Armstrong Prong	C	223		51
02433	Arpan Butte	C	1,259		137
00698	Ash Draw	C	240		47
02323	Bader Gulch	C	83		20
02377	Badger Creek	C	40		8
02437	Badger Tract	C	40		7
22204	Baldwin Creek	C	640		47
22009	Bales Ranch Inc	C	80		11
02328	Banner	C	120		24
22011	Barbe Dorie J	C	120		13
32013	Barlow	C	89		13
02442	Barnum Mountain Rd.	C	2,735		277
02414	Barnum Mtn Road	C	40		8
22224	Barnum Mtn Spring	C	80		13
12236	Bates Creek	C	80		12
02475	Bayer Creek	C	120		34
12191	Bear Gulch	M	3,837		612
12168	Beartrap	C	483		76
12072	Beartrap Creek	I	2,171		249
22111	Beaver Creek	C	440		54
12157	Beaver Creek Slope	I	8,098		546
12041	Bed Springs Draw	C	358		23
02478	Beebee	C	320		211
22127	Bekebrede Draw	C	80		20
12209	Belle Fourche Tr	C	800		159
02288	Belus	C	120		30
22017	Belus Ranch	C	292		51
32019	Betz Alvin F.	C	185		21
02262	Billy Creek	C	280		44
12228	Billy Creek Camp	C	80		6
02324	Billy Creek School	C	40		10
22021	Bishop	M	8,632		1,483

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Permitted Use (AUMs)
12048	Bitter Creek	C	1,025		122
22022	Bittercreek	C	80		16
22028	Black Draw	C	2,581		300
12230	Black Stump Draw	C	200		50
42013	Blue Creek	M	2,221		223
12189	Bode Gulch	C	560		59
22210	Bone Pile Creek	C	241		45
02254	Box Elder Draw	C	71		8
32005	Bridge Draw	M	2,720		274
12219	Bright Spring Draw	C	240		61
02243	Brower Draw	C	310		30
12035	Brown Kennedy Ranch	M	2,122		501
12192	Bugher Draw	C	1510		123
12213	Bull Camp	M	2,475		252
02474	Bull Camp Canyon	C	315		24
22212	Bull Creek	C	2,713		250
32018	Bull Creek	C	278		40
12161	Burnt Hollow	I	13,790	AMP IMPLEMENTED	2,400
12046	Butcher	C	640		119
12047	Butcher Ranch	C	240		61
12208	Caballo Draw	C	680		113
02258	Cabin Canyon	C	2,366		356
02299	Cabin Creek	M	3,139		309
12049	Camblin	C	690		130
02289	Campbell Draw	C	413		56
22201	Carpenter Draw	C	760		81
02265	Carr	C	400		43
12053	Carson Dan	C	80		16
12052	Carson, O. And R.J.	C	240		37
02450	Carter Draw	C	220		30
12165	Carter Draw	C	880		45
12054	Cash	C	80		14
12177	Castle Rock	M	5,256		610
02376	Cat Creek	I	5,696		552
12175	Cates Draw	C	1,689		173
12057	Chabot, August, Et Al	C	280		19
02384	Chabot, August, Et Al	C	147		14
02468	Chalk Hills	C	203		29
12211	Charlie Draw	C	1,482		306
02290	Chicken Creek Divide	C	40		7
32020	Clark, Glen L	C	1,247		131
02398	Claypit, Trough Draw	C	1,120		132
02093	Clear Creek	C	396		39

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Permitted Use (AUMs)
12065	Clear Creek Grazing	C	908		92
12149	Coal Creek	C	117		18
12069	Cook	C	40		6
02248	Coon Track Creek	C	121		18
22027	Cordero Allotment	C	480		78
12024	Corral Creek	C	36		5
00754	Cotton	C	40		4
02424	Cottonwood (Knudson)	C	923		106
02261	Cottonwood Creek	C	120		26
22130	Cottonwood Creek E	C	80		12
12143	Cottonwood Creek I	C	160		47
02427	Cottonwood Draw	C	400		72
12179	Cottonwood Draw	C	1,020		105
02357	County Line	C	1,122		153
22132	Coutant Creek	C	320		39
12186	Cow Creek	C	2,706		251
22125	Cow's Face	C	360		24
12059	Craney Draw	M	0		0
12094	Crazy Woman Creek	C	760		80
12218	Crenshaw Hill	C	719		87
12090	Cromack Draw	C	427		93
02426	Crooked Creek	I	20,367	AMP IMPLEMENTED	2,694
22206	Cross H Creek	C	313		49
12184	Croton	M	1,028		174
02352	Cutler Draw	C	161		27
02332	Dabney	C	80		11
12074	Daly	C	120		22
12075	Daly Livestock Co.	C	6,138		1,107
02397	Davis Draw	M	788		81
12105	Davis Draw Common	M	970		156
02400	Davis Draw/ Johnson Allotment	M	1,394		149
02322	Dead Horse	C	85		8
12176	Dead Horse Creek	I	9,119		993
22113	Dead Horse Creek Oilfield	C	1,261		216
12062	Deadman Draw	C	1,890		186
02396	Dean Graves	C	720		94
02267	Deep Creek	C	160		41
22102	Deer Creek	M	10,958		1,245
32004	Deer Creek I	C	80		10
12096	Deer Gulch	M	5,566		1,135

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Permitted Use (AUMs)
02270	Dixie Reece	C	263		30
02402	Donlin	C	501		134
12039	Drainage Draw	C	80		11
02412	Dry Creek	C	372		42
22229	Dry Creek Basin	C	79		14
12080	Dry Creek Ranch Inc.	M	4,948		1,074
02285	Dry Creek Res.	C	40		4
02250	Dry Fork	C	3,314		488
02341	Dry Fork P.R.	C	1,406		235
02407	Dry Muddy Creek	C	80		18
12144	Dry Trail Creek	C	2,086		389
02344	Dry Vee	M	4,442	AMP PROPOSED	911
02374	Duck Creek	C	41		12
22026	Duck Creek 2	C	217		60
02453	Dugout Creek	I	9,341		1,217
22124	Dull Knife	I	9,173		553
12031	Dull Knife Pass	M	5,047		603
02317	Dutch Creek	C	80		14
12200	E.K. Mountain	C	156		26
12037	East Fork	C	680		128
22225	East Spring Draw	M	5,683		550
12232	Echeta	C	320		37
02388	Eighty-Five Divide	C	1,319		328
12100	Eighty-Five Divide	M	1,679		384
12034	Elk Creek Road	C	40		8
12086	Elliot Curtis	C	114		24
12089	Elsom Brothers	C	1,760		133
12067	Encres Draw	C	40		7
22215	Erickson Draw	C	840		96
12139	Falxa	I	14,759	AMP IMPLEMENTED	1,546
12097	Fauber George	C	120		7
12162	Fence Creek	I	4,820	AMP IMPLEMENTED	655
14811	Figure 8	C	494		42
12099	Fitch Draw	M	1,840		250
32006	Flats	C	2,947		254
12078	Flying E	I	16,603		1,672
12066	Flying U Ranch	M	4,236		826
12045	Forest Tract	C	320		16
12151	Fort Creek	M	19,376		2,235
42001	Fortification Creek	C	894		102
22107	Fortin Draw	C	40		10
22109	Foster, Ralph T.	C	880		147
12076	Four Corners	M	2,109		422
22126	Four Horse	C	1,175		215
02242	Four Horse Creek	C	320		84
12050	Fourmile	M	4,879		433

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Permitted Use (AUMs)
02293	Fourmile 94	C	156		15
02379	Fourmile Ranch	I	7,595		623
12070	Fowler Draw	C	151		18
12088	Freeman Camp	C	800		32
02391	Freeman Draw	M	2,710		445
12079	Gammon Draw	C	37		9
22112	Garber Victor Et Al	C	280		62
02306	Gardner Lake	C	40		13
02476	Gardner Mt. (South)	M	1,622	AMP IMPLEMENTED	193
02336	Gates-Yonkee	C	560		86
22120	Gibbs Brothers	C	95		12
12085	Goble Draw	C	478		48
12226	Gold Mine Road	C	494		63
22121	Gordon	M	6,674		761
02335	Gordon Creek	I	2,118		285
02428	Gosney Airstrip	C	40		2
02395	Gosney, Elmer	C	278		61
12193	Government Draw	M	3,590		380
02421	Grandma's Bend	C	84		14
02360	Gray Cabin Draw	C	2,230		270
12174	Green Draw	C	160		29
32003	Green Hill	C	40		5
02469	Grub Draw	I	10,120		1,019
22129	Hamm Don Robert	C	362		77
12154	Hampshire	C	1,144		129
12134	Harlan James S.	C	441		24
12136	Harper George Mary	C	120		30
14812	Harper Reservoir	C	23		2
12147	Hat Ranch	M	6,573		493
32002	Hay Creek	C	80		26
02440	Healy	C	280		35
12153	Hepp Charles	M	2,404		228
12231	Hilight	C	40		8
02443	Hill Prong	C	80		13
22114	Hines	C	120		24
12180	Hoblit	C	140		23
12169	Hoe Ranch	I	15,279		1,676
02393	Hole In The Wall	I	9,000		738
22116	Holler Draw	C	482		62
02410	Homestead Draw 4150'	C	80		11
10342	Hope	I	3,423	AMP IMPLEMENTED	555
12240	Horse Creek	M	1,110		231
02434	Horse Creek	C	2,071		427
02423	Horse Creek/ Pipeline	C	40		8
02327	Horseshoe Ranch	C	880		24

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Permitted Use (AUMs)
02461	HQ and Taylor Spring	C	912		101
02415	Indian Creek	M	2,587		301
02274	Ivy Creek	C	83		8
12061	Jackplane	C	2,664		266
02394	Jeep Trail	C	200		20
02320	Jeffers Draw	C	39		6
12158	Jiggs Reservoir	C	117		28
02257	Jim Crow Creek	C	597		113
02460	Johnson Creek	C	354		31
02401	Johnson Draw	C	2,288		232
02382	Jones Draw	C	40		6
02447	K Ranch	C	1,361		187
12148	Kaycee L And L	C	761		43
02251	Keathley Draw	C	385		39
12178	Kendrick	M	5,351		874
02277	Keyes Draw	C	79		9
22202	Kingsbury/Wild Horse	C	160		32
12038	Kline Draw	C	400		43
12056	Kurtley Draw	C	1,277		135
02364	Lanabaugh No. 4 Draw	C	40		10
02301	Larey Draw	C	2,320		385
02347	Lariat	C	200		20
22108	Larrechea	C	280		48
12190	Lawrence Charles	C	2,838		285
12188	Lawrence Land Co. Inc.	C	165		19
12023	Lawver	M	4,646		815
12194	Legerski Ranch	C	359		72
02325	Linch	C	1,441		173
12197	Linch	C	80		15
02305	Linn Draw	C	1,440		236
12198	Little Bighorn Ranch	C	40		8
12233	Little Cedar Draw	C	200		28
32007	Little Poison Creek	C	2,244		218
02358	Little Powder River	M	3,711		750
02279	Little Rawhide	C	40		10
02310	Little Willow	I	6,080	AMP IMPLEMENTED	823
02307	Little Youngs Creek	C	169		34
22123	Lone Tree	C	40		7
02343	Long Draw	C	719		99
02466	Lower Willow Glen	C	80		11
02355	Lx Bar	C	1,230		126
02368	Mark Gordon	C	1,282		132
02445	Marton	C	41		7

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Permitted Use (AUMs)
02309	Mary Straatsma Est.	C	40		6
22221	Maycock Draw	C	719		72
02406	Mayer	C	98		12
02346	Mayor	I	3,157		384
12032	Mayoworth S. Of Sdw	C	240		20
02370	Meadow Creek	M	2,355		248
02303	Meadow Draw	C	160		16
12227	Michelena	M	3,405	AMP PROPOSED	348
22055	Mickelberry Creek	C	160		16
12030	Middleberry Draw	C	1,778		178
14952	Mitchell Breaks	M	2,268	AMP IMPLEMENTED	391
02429	Mitchell Draw	M	4,306		419
12140	Montgomery	C	1,861		204
00749	Moore Reservoir	C	40		8
12235	Moore, James R.	C	3,971		782
02408	Moriarty, Jack L.	C	40		8
02435	Morris Draw	C	1,272		144
22029	Mosier Gulch	M	160		41
02373	Mountain	I	8,390	AMP IMPLEMENTED	778
02446	Mountain	C	1,846		223
02449	Mountain (Elm)	C	241		35
02338	Mountain East	C	260		26
02367	Mud Spring Creek	C	80		16
22223	Muddy Creek	C	40		18
22128	Mumma Draw	C	240		54
02354	Murray Draw	C	40		8
02362	N. Fork 9 Mile Creek	C	283		40
02431	N. Gray Cabin Draw	C	723		87
32014	N. Windmill	I	2,074	AMP IMPLEMENTED	276
02418	N. Fork Powder R.	C	212		34
02340	N. Leiter	C	117		40
02444	N. Scotch	C	201		105
02092	N. Cottonwood Cr.	C	79		23
02348	Napier	M	3,242		529
12095	Neil Butte	C	40		6
12238	Niedringhaus Lambert	C	440		24
02425	Ninemile	C	40		5
12081	Nipple Butte	C	1,928		389
02239	Norfolk John	M	1,840		299
22119	North Mitten	C	103		21

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Permitted Use (AUMs)
02363	North Ridge	C	335		57
02295	North Trabing	M	560		78
02436	North West - Iberlin	C	320		32
22008	Number Two Draw	C	1,078		170
02457	OK Creek	C	2,302		216
02390	Olmstead	I	832	AMP IMPLEMENTED	179
02058	Olsen Draw	C	4,892		592
02249	Osborn	C	280		39
02287	Padlock Ranch Co.	C	440		88
12068	Pass Reservoir	C	1,225		118
02405	Peterson Draw	C	2,736		335
12156	Petrified Tree	M	1,867		218
12159	Phinney Draw	C	878		91
02413	Pine Ridge	C	720		76
12166	Pine Ridge	C	240		49
02454	Pine Ridge	C	320		27
02256	Pinette Draw	C	200		48
12229	Piney Creek	C	40		7
02252	Ploesser	C	385		38
02472	Plosser	C	415		47
02441	Plum Creek Draw	C	390		84
32012	Pointed Butte	C	40		11
12195	Poison Creek	M	1,315		148
02419	Poker Creek	I	3,697	AMP IMPLEMENTED	837
02404	Pollard Draw	C	798		79
02430	Powder River	I	4,526	AMP IMPLEMENTED	944
02260	Powder River Ranch	I	17,085		1,779
02422	Prairie Creek	C	38		13
02350	Prong	C	534		92
12164	Prong Spotted Horse	C	2,129		271
22226	Pugsley Hill	C	40		6
12138	Pumpkin Creek	I	13,325		1,454
12172	Quinn, John, Bonnie	C	40		7
02264	Rafter L.	C	1,514		238
02266	Ramsbottom	M	7,189		430
02319	Rattlesnake Creek	C	40		12
12098	Rattlesnake Springs	C	432		46
12040	RBL	C	360		43
12171	Read Draw	C	40		4
02269	Reculusa	C	160		42
12051	Red Canyon	C	2,264		270
02365	Red Draw	M	2,115		128

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Permitted Use (AUMs)
12033	Red Fork	I	10,000	AMP IMPLEMENTED	917
02409	Red Fork Mtn Camp	C	203		7
02253	Red Hills	C	759		127
02416	Red Wall	C	459	AMP IMPLEMENTED	78
02271	Reece Ernest	M	2,715		414
02330	Reel	C	40		6
02275	Remington Creek	M	2,676	AMP IMPLEMENTED	290
02385	Reno	C	160		16
02268	Reno Draw	C	558		63
22205	Robinson Draw	C	69		9
12155	Robinson Place	C	630		68
02329	Rochelle Hills	C	80		12
12087	Rock Ridge	C	1,360		93
02321	Rocky Butte	C	2,075		367
12118	Rosie Draw	C	200		29
02491	Rossnecker Draw	C	42		6
02278	Rourke & Offutt	C	477		125
02263	Rozet	C	40		8
02465	Ryan	C	160		46
02259	S. Wyodak	C	120		32
02386	S. Fork Otter Creek	C	120		17
02452	S. Gillette Forty	C	40		10
22203	S. Leiter	C	1,457		146
02372	S.F. Crazy Woman	C	80		14
02281	S.F. Three Bar	C	215		43
22110	Sahara Draw	C	120		20
02411	Salt Creek	M	4,249		551
02272	Sand Rock/Hoe Creek	C	74		11
00743	Sawmill	C	240		12
12185	Schiermiester	C	800		114
22122	School Sec Dr/Mdlfrk	C	160		27
12073	School Section Draw	C	478		43
22214	Schoonover Ranch	I	12,482	AMP IMPLEMENTED	1,528
12137	Scotch	C	200		10
02353	Scott Draw	C	306		32
02286	Scott Marion	C	560		124
12083	Scotty Draw	C	4,500		624
02276	Se Of Buffalo Creek	C	1,140		152
02369	Senff Ditch	C	80		13
02463	SF Holler Draw	C	280		26
02375	S. Fork Arkansas Creek	C	200		36
02292	Simpson, John H.	C	1,156		198

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Permitted Use (AUMs)
02471	Sioux Battle	C	241		26
02459	Sippie Mine	C	520		53
02291	Skidmore Estate	C	26		9
02371	Slope	I	3,960	AMP IMPLEMENTED	1,044
02399	Slope/Mountain, Allotment	C	2,032		256
02297	Smith	C	322		34
02300	Smith	C	120		23
32010	Smith Creek	C	160		10
02383	Smith Cut	C	3,235		615
02294	Soldier Creek Ranch	C	1,343		229
02495	Sony Draw	M	5,101		513
02498	South Carpenter Draw	C	240		2
02451	South Fork	I	7,466		726
02389	South Fork Powder R.	M	4,890		380
02280	South Middle Butte	C	639		67
12183	South Middle Prong	C	640		73
02467	South Sussex Stkrst	C	27		14
00744	South Tabletop	C	120		15
02296	South Trabing	M	1,039		111
02351	South Twin Creek	C	200		33
22220	Spellman	C	1,278		163
02477	Spotted Horse Creek	C	961		105
02241	Spring Creek	C	1,231		287
22025	Squaw Butte	C	40		11
02298	Squaw Creek	M	2,566		289
02255	Stateline	C	71		18
12131	Steel Creek	C	200		20
02308	Stephenson, Marie	C	80		20
02387	Stone Draw	C	80		20
12160	Stotts Draw	C	1,934		193
02312	Stuart, James R.	C	80		16
02403	Stubbs Draw	C	493	AMP IMPLEMENTED	69
02313	Suel Anna Trustee	C	200		40
12167	Sussex Cutoff	I	1,318		105
12133	Sussex Oil Company	C	920		46
02420	Sussex Stockrest	I	305		50
02316	Swartz, Edward H.	M	2,480		621
02438	T.W.	I	1,840	AMP IMPLEMENTED	184
12141	Tabletop	C	80		8

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Permitted Use (AUMs)
12145	Tarver Trust	C	689		128
02458	Td Southwest	C	120		20
02333	Thom Brothers	C	31		4
02349	Three Mile Creek	C	441		90
12101	Threemile Creek Reservoir	C	80		18
02337	Throne John And Earl	C	120		24
02432	Timar East	C	1,122		116
12199	Timber Draw	C	74		10
02494	Tipperary	C	360		38
22213	Tongue River	I	1,767	AMP IMPLEMENTED	476
02339	Trail Creek	M	7,244		2,624
02417	Trail Side	C	40		14
12043	Trough Draw	C	760		34
00697	Truman Draw	M	2,032		347
02282	Ttt	M	14,155		1,563
02456	Tuttle Draw	C	320		92
02470	Tuttle Draw/Deep Crk	C	554		154
12187	Twenty Mile Creek	I	6,100		808
12142	Tyree Place	C	40		8
02448	Upper Cabin Creek	C	240		43
02273	Upper Fort Creek	C	920		205
12152	Upper Grub	C	1,640		164
12207	Upper Kaufman Draw	M	1920		262
12163	Ute Creek	C	117		17
02284	V Bar F	M	2,797		364
02345	Vanderhoff	C	360		26
02311	Vanhouten	M	1,057		107
12077	W. Sussex (Hickey)	I	3,320		483
02381	Wagensen Don Et Al	C	80		20
22106	Wagonhammer	M	3,881	AMP IMPLEMENTED	1,352
02492	Walker Draw	C	440		48
12146	Wall (East)	C	1,840		247
22104	Walsh	C	340		34
02304	Washout Dr.	M	1,859		315
02318	Water Gap Draw	M	9,043		1,127
02356	Watt Ranch	C	46		6
12181	West Bowman Hill	C	2,311		522
02490	West Coutant Creek	C	80		14
02462	West Fork	C	240		26
12091	West Timber Creek	C	240		32

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Permitted Use (AUMs)
02170	West Timber Draw	C	960		100
12063	Weston SW	M	4,435		829
02326	White Rock	C	440		58
02247	White Tail Creek	C	200		62
12237	Whitetail Creek	M	3,391		751
22222	Whitetail Pines	M	1,493		299
02455	Whitmeyer	C	120		21
02302	Whitmeyer Creek	C	40		6
12082	Wild Horse Creek	C	120		24
32015	Wild Horse Creek	C	80		8
02283	Wildcat	C	80		16
10069	Willow Creek	I	26,822		4,412
12036	Willow Creek	C	2,715		462
02331	Winter Draw	C	40		6
12216	Wolf Mountain	C	515		57
02380	Wormwood Ranch	I	20,699	AMP IMPLEMENTED	2,497
12042	Wyarno	C	120		24
02334	Wythom Road	C	120		20
12150	Yellowhammer	M	1,776		206

Source: BLM 2009a
AMP Allotment Management Plan
AUM Animal Unit Month
C Custodial
I Improve
M Maintain

E.2. Standards and Guidelines Status

Table E.2. Summary of Standards and Guidelines Evaluations

Allotment Name	Allotment Number	Year Completed	Progress	Standard[1, 2]					
				1	2	3	4	5	6
Bear Gulch	12191	2006		Y	Y	Y	Y	U	U
Beartrap Creek	12072	2000		Y	Y	Y	Y	U	U
Beaver Creek Slope	12157	2002		Y	Y	Y	Y	U	U
Bishop	22021	2001		Y	Y	Y	Y	U	U
Bridge Draw	32005	2006		Y	Y	Y	Y	U	U
Bull Camp	12213	2005		Y	Y	Y	Y	U	U
Butcher	12046	2007		Y	Y	Y	Y	U	U
Cabin Creek	02299	2003		Y	Y	Y	Y	U	U
Castle Rock	12177	2007		Y	Y	Y	Y	U	U

Allotment Name	Allotment Number	Year Completed	Progress	Standard[1, 2]					
				1	2	3	4	5	6
Castle Rock	12177	2007		Y	Y	Y	Y	U	U
Cat Creek	02376	2002		Y	Y	Y	Y	U	U
Clear Creek	02093	2008		Y	Y	Y	Y	U	U
Crooked Creek	02426	1999		Y	Y	Y	Y	U	U
Croton	12184	2006		Y	Y	Y	Y	U	U
Daly	12074	2007		Y	Y	Y	Y	U	U
Daly Livestock Co.	12075	2007		Y	Y	Y	Y	U	U
Davis Draw	02397	2005		Y	Y	Y	Y	U	U
Davis Draw Common	12105	2005	Y	N	Y	N	Y	U	U
Davis Draw/ Johnson Allotment	02400	2005		Y	Y	Y	Y	U	U
Dead Horse Creek	12176	1999		Y	Y	Y	Y	U	U
Deer Creek	22102	2000		Y	Y	Y	Y	U	U
Deer Gulch	12096	2002		Y	Y	Y	Y	U	U
Donlin	02402	2001		Y	Y	Y	Y	U	U
Dry Creek Ranch Inc.	12080	2005		Y	Y	Y	Y	U	U
Dugout Creek	02453	1999		Y	Y	Y	Y	U	U
Dull Knife	22124	2002		Y	Y	Y	Y	U	U
Dull Knife Pass	12031	2005		Y	Y	Y	Y	U	U
Eagle Creek	02344	1998		Y	Y	Y	Y	U	U
East Spring Draw	22225	2006		Y	Y	Y	Y	U	U
Eighty-Five Divide	12100	2005		Y	Y	Y	Y	U	U
Elsom Brothers	12089	2001		Y	Y	Y	Y	U	U
Falxa	12139	1999		Y	Y	Y	Y	U	U
Fence Creek	12162	1999		Y	Y	Y	Y	U	U
Fitch Draw	12099	1999		Y	Y	Y	Y	U	U
Flying E	12078	1998		Y	Y	Y	Y	U	U

Allotment Name	Allotment Number	Year Completed	Progress	Standard[1, 2]					
				1	2	3	4	5	6
Flying U Ranch	12066	2006		Y	Y	Y	Y	U	U
Fort Creek	12151	2002		Y	Y	Y	Y	U	U
Four Corners	12076	2005		Y	Y	Y	Y	U	U
Fourmile	12050	2006		Y	Y	Y	Y	U	U
Fourmile Ranch	02379	2002		Y	Y	Y	Y	U	U
Gardner Mt. (South)	02476	1999		Y	Y	Y	Y	U	U
Gordon	22121	2002		Y	Y	Y	Y	U	U
Gordon Creek	02335	1999		Y	Y	Y	Y	U	U
Government Draw	12193	2008		Y	Y	Y	Y	U	U
Grub Draw	02469	2001		Y	Y	Y	Y	U	U
Hat Ranch	12147	2004		Y	Y	Y	Y	U	U
Hepp Charles	12153	2005		Y	Y	Y	Y	U	U
Hoe Ranch	12169	2000		Y	Y	Y	Y	U	U
Hole In The Wall	02393	2002	Y	Y	N	N	Y	U	U
Hope	10342	1999		Y	Y	Y	Y	U	U
Horse Creek	02434	2007		Y	Y	Y	Y	U	U
Indian Creek	02415	2006		Y	Y	Y	Y	U	U
Jackplane	12061	2008		Y	Y	Y	Y	U	U
Johnson Draw	02401	2008		Y	Y	Y	Y	U	U
Kendrick	12178	2006		Y	Y	Y	Y	U	U
Lawver	12023	2007		Y	Y	Y	Y	U	U
Little Powder River	02358	2001		Y	Y	Y	Y	U	U
Little Willow	02310	2002		Y	Y	Y	Y	U	U
M. Gordon	02368	2008		Y	Y	Y	Y	U	U
Mayor	02346	2001		Y	Y	Y	Y	U	U
Meadow Creek	02370	2006		Y	Y	Y	Y	U	U
Michelena	12227	2004		Y	Y	Y	Y	U	U
Mitchell Draw	02429	2006		Y	Y	Y	Y	U	U
Morris Draw	02435	2008		Y	Y	Y	Y	U	U
Mosier Gulch	22029	2006		Y	Y	Y	Y	U	U

Allotment Name	Allotment Number	Year Completed	Progress	Standard[1, 2]					
				1	2	3	4	5	6
Mountain	02373	1999		Y	Y	Y	Y	U	U
N Windmill	32014	1998		Y	Y	Y	Y	U	U
Napier	02348	2006		Y	Y	Y	Y	U	U
North Trabing	02295	2004		Y	Y	Y	Y	U	U
Olmstead	02390	1998		Y	Y	Y	Y	U	U
Olsen Draw	02058	2007		Y	Y	Y	Y	U	U
Petrified Tree	12156	2004		Y	Y	Y	Y	U	U
Plosser	02472	2008		Y	Y	Y	Y	U	U
Poison Creek	12195	2005		Y	Y	Y	Y	U	U
Poker Creek	02419	1999		Y	Y	Y	Y	U	U
Powder River	02430	1998		Y	Y	Y	Y	U	U
Powder River Ranch	02260	2003		Y	Y	Y	Y	U	U
Pumpkin Creek	12138	2001		Y	Y	Y	Y	U	U
Red Draw	02365	2006		Y	Y	Y	Y	U	U
Red Fork	12033	1999		Y	Y	Y	Y	U	U
Reece Ernest	02271	2006		Y	Y	Y	Y	U	U
Remington Creek	02275	2008		Y	Y	Y	Y	U	U
Rock Ridge	12087	2006		Y	Y	Y	Y	U	U
Salt Creek	02411	2005		Y	Y	Y	Y	U	U
Schiermiester	12185	2008		Y	Y	Y	Y	U	U
Schoonover Ranch	22214	1998		Y	Y	Y	Y	U	U
Sioux Battle	02471	2003	Y	Y	Y	N	Y	U	U
Slope	02371	1999		Y	Y	Y	Y	U	U
Sony Draw	02495	2006		Y	Y	Y	Y	U	U
South Fork	02451	2003		Y	Y	Y	Y	U	U
South Fork Powder R.	02389	2000		Y	Y	Y	Y	U	U
South Trabing	02296	2004		Y	Y	Y	Y	U	U
Squaw Creek	02298	2005		Y	Y	Y	Y	U	U
Stubbs Draw	02403	1999		Y	Y	Y	Y	U	U

Allotment Name	Allotment Number	Year Completed	Progress	Standard[1, 2]					
				1	2	3	4	5	6
Sussex Cutoff	12167	2000		Y	Y	Y	Y	U	U
Sussex Stockrest	02420	2000		Y	Y	Y	Y	U	U
Swartz, Edward H.	02316	2007		Y	Y	Y	Y	U	U
T.W.	02438	1998		Y	Y	Y	Y	U	U
Timar East	02432	2004		Y	Y	Y	Y	U	U
Trail Creek	02339	2006		Y	Y	Y	Y	U	U
Trough Draw	12043	2008		Y	Y	Y	Y	U	U
Ttt	02282	2000		Y	Y	Y	Y	U	U
Twenty Mile Creek	12187	2000		Y	Y	Y	Y	U	U
Upper Grub	12152	2005		Y	Y	Y	Y	U	U
Upper Kaufman Draw	12207	2006		Y	Y	Y	Y	U	U
V Bar F	02284	2006		Y	Y	Y	Y	U	U
Van-houten	02311	2003		Y	Y	Y	Y	U	U
W. Sussex (Hickey)	12077	2001		Y	Y	Y	Y	U	U
Wag-onham-mer	22106	1998		Y	Y	Y	Y	U	U
Washout Dr.	02304	2005		Y	Y	Y	Y	U	U
Water Gap Draw	02318	2005		Y	Y	Y	Y	U	U
Whitetail Creek	12237	2001		Y	Y	Y	Y	U	U
Whitetail Pines	22222	2002		Y	Y	Y	Y	U	U
Willow Creek	10069	2004		Y	Y	Y	Y	U	U
Worm-wood Ranch	02380	1998		Y	Y	Y	Y	U	U

Allotment Name	Allotment Number	Year Completed	Progress	Standard[1, 2]					
				1	2	3	4	5	6
Yellowhammer	12150	2004		Y	Y	Y	Y	U	U

Source(s): BLM 1998 - 2008

[1] Codes in Progress and Standard columns are as follows:
Y Yes meets standard
N No does not meet standard
U Unknown

[2] Standards 5 and 6 are dependent upon determinations made by the Wyoming Department of Environmental Quality (DEQ). Standard 5 is Unknown if allotment specific data is not available. Wyoming DEQ has not identified air quality impairments within the Buffalo Field Office resulting in Standard 6 being met.

E.3. Livestock Grazing Allotments Within Greater Sage-Grouse Habitat

Table E.3. Grazing Allotments within 4.0 Miles of Occupied Greater Sage-Grouse Leks

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Permitted Use (AUMs)	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
12182	4mile Creek/RC	C	369		41	
02378	76 Creek	C	200		33	X
02314	Adon	C	40		6	
22115	Allemand	C	1,520		184	X
02246	Anderson Draw	C	178		21	
12173	Antelope Basin	C	449		47	X
02366	Antelope Draw	C	40		6	X
02493	Armstrong Prong	C	223		51	X
02433	Arpan Butte	C	1,259		137	X
00698	Ash Draw	C	240		47	X
02323	Bader Gulch	C	83		20	
02377	Badger Creek	C	40		8	X
02437	Badger Tract	C	40		7	X
22204	Baldwin Creek	C	640		47	
22009	Bales Ranch Inc	C	80		11	X
02328	Banner	C	120		24	
22011	Barbe Dorie J	C	120		13	X
32013	Barlow	C	89		13	X
02442	Barnum Mountain Road	C	2,735		277	

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Permitted Use (AUMs)	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
02414	Barnum Mtn. Road	C	40		8	
22224	Barnum Mtn. Spring	C	80		13	
12236	Bates Creek	C	80		12	
02475	Bayer Creek	C	120		34	
12191	Bear Gulch	M	3,837		612	
12168	Beartrap	C	483		76	
12072	Beartrap Creek	C	2,171		249	
22111	Beaver Creek	C	440		54	
12157	Beaver Creek Slope	I	8,098		546	
12041	Bed Spring Draw	C	358		23	X
02478	Beebee	C	320		211	
22127	Bekebrede Draw	C	80		20	X
12209	Belle Fourche Tr.	C	800		159	X
02288	Belus	C	120		30	
22017	Belus Ranch	C	292		51	X
32019	Betz Alvin F	C	185		21	X
02262	Billy Creek	C	280		44	
12228	Billy Creek Camp	C	80		6	
02324	Billy Creek School	C	40		10	
22021	Bishop	C	8,632		1,483	X
12048	Bitter Creek	C	1,025		122	
22022	Bittercreek	C	80		16	
22028	Black Draw	C	2,581		300	
12230	Black Stump Draw	C	200		50	
42013	Blue Creek	C	2,221		223	
12189	Bode Gulch	C	560		59	
22210	Bone Pile Creek	C	241		45	X
02254	Box Elder Draw	C	71		8	X
32005	Bridge Draw	C	2,720		274	X
12219	Bright Spring Draw	C	240		61	X
02243	Brower Draw	C	310		30	X
12035	Brown Kennedy Ranch	M	2,122		501	X
12192	Bugher Draw	C	1,510		123	X
12213	Bull Camp	M	2,475		252	

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Permitted Use (AUMs)	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
02474	Bull Camp Canyon	C	315		24	
22212	Bull Creek	C	2,713		250	
32018	Bull Creek	C	278		40	
12161	Burnt Hollow	I	13,790		2,400	X
12046	Butcher	C	640		119	X
12047	Butcher Ranch	C	240		61	X
12208	Caballo Draw	C	680		113	X
02258	Cabin Canyon	C	2,366		356	X
02299	Cabin Creek	M	3,139		309	X
12049	Camblin	C	690		130	X
02289	Campbell Draw	C	413		56	X
22201	Carpenter Draw	C	760		81	X
02265	Carr	C	400		43	X
12053	Carson, Dan	C	80		16	X
12052	Carson, O. and R.J.	C	240		37	X
02450	Carter Draw	C	220		30	X
12165	Carter Draw	C	880		45	X
12054	Cash	C	80		14	X
12177	Castle Rock	M	5,256		610	X
02376	Cat Creek	I	5,696		552	X
12175	Cates Draw	C	1,689		173	X
12057	Chabot August Et Al	C	280		19	X
02384	Chabot August Et Al	C	147		14	
02468	Chalk Hills	C	203		29	X
12211	Charlie Draw	C	1,482		306	X
02290	Chicken Creek Divide	C	40		7	X
32020	Clark, Glen L.	C	1,247		131	X
02398	Claypit	C	1,120		132	X
02093	Clear Creek	C	396		39	X
12065	Clear Creek Grazing	C	908		92	X
12149	Coal Creek	C	117		18	X
12069	Cook	C	40		6	X
02248	Coon Track Creek	C	121		18	X
22027	Codero Allotment	C	480		78	X
12024	Corral Creek	C	36		5	X
00754	Cotton	C	40		4	X
02424	Cottonwood (Knudson)	C	923		106	X

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Permitted Use (AUMs)	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
022661	Cottonwood Creek	C	120		26	X
22130	Cottonwood Creek E	C	80		12	X
12143	Cottonwood Creek I	C	160		47	X
02427	Cottonwood Draw	C	400		72	X
12179	Cottonwood Draw	C	1,020		105	X
02357	County Line	C	1,122		153	X
22132	Coutant Creek	C	320		39	X
12186	Cow Creek	C	2,706		251	X
22125	Cow's Face	C	360		24	
12094	Crazy Woman Creek	C	760		80	X
12218	Crenshaw Hill	C	719		87	X
12090	Cromack Draw	C	427		93	X
02426	Crooked Creek	I	20,367	AMP Implemented	2694	X
22206	Cross H Creek	C	313		49	X
12184	Croton	M	1,028		174	X
02352	Cutler Draw	C	161		27	
02332	Dabney	C	80		11	X
12074	Daly	C	120		22	
12075	Daly Livestock Co.	C	6,138		1107	X
02397	Davis Draw	M	788		81	X
12105	Davis Draw common	M	970		156	X
02400	Davis Draw/ Johnson	M	1,394		149	X
02322	Dead Horse	C	85		8	
12176	Dead Horse Creek	I	9,119		993	X
22113	Dead Horse Creek Oilfield	C	1,261		216	X
12062	Deadman Draw	C	1,890		186	
02396	Dean Graves	C	720		94	
02267	Deep Creek	C	160		41	X
22102	Deer Creek	M	10,958		1245	X
32004	Deer Creek I	C	80		10	X
12096	Deer Gulch	M	5,566		1135	X
02270	Dixie Reese	C	263		30	X
02402	Donlin	C	501		134	
12039	Drainage Draw	C	80		11	X
02412	Dry Creek	C	372		42	

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Permitted Use (AUMs)	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
22229	Dry Creek Basin	C	79		14	X
12080	Dry Creek Ranch	C	4,948		1074	X
02285	Dry Creek Res	C	40		4	X
02250	Dry Fork	C	3,314		488	X
02341	Dry Fork P.R.	C	1,406		235	X
02407	Dry Muddy Creek	C	80		18	
12144	Dry Trail Creek	C	2,086		389	X
02344	Dry Vee	M	4,442	AMP PROPOSED	911	X
02374	Duck Creek	C	41		12	X
22036	Duck Creek 2	C	217		60	
02453	Dugout Creek	I	9,341		1217	
22124	Dull Knife	I	9,173		553	
12031	Dull Knife Pass	M	5,047		603	X
02317	Dutch Dreek	C	80		14	
12200	E.K. Mountain	C	156		26	X
12037	East Fork	C	680		128	X
22225	East Spring Draw	M	5,683		550	X
12232	Echeta	C	320		37	X
02388	Eightyfive Divide	C	1,319		328	X
12100	Eighty-five Divide	M	1,679		384	X
12034	Elk Creek Road	C	40		8	X
12086	Elliot Curtis	C	114		24	
12089	Elsom Brothers	C	1,760		133	
12067	Encres Draw	C	40		7	X
22215	Erickson Draw	C	840		96	X
12139	Falxa	I	14,759	AMP Implemented	1,546	X
12097	Fauber George	C	120		7	
12162	Fence Creek	I	4,820	AMP Implemented	655	X
14811	Figure 8	C	494		42	X
12099	Fitch Draw	M	1,840		250	X
32006	Flats	C	2947		254	X
12078	Flying E	I	16,603		1,672	X
12066	Flying U Ranch	M	4,236		826	
12045	Forest Tract	C	320		16	
12151	Fort Creek	M	19,376		2,235	X
42001	Fortification Creek	C	894		102	
22107	Fortin Draw	C	40		10	X

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Permitted Use (AUMs)	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
22109	Foster, Ralph	C	880		147	X
12076	Four Corners	M	2,109		422	X
22126	Four Horse	C	1,175		215	X
02242	Four Horse Creek	C	320		84	X
12050	Fourmile	M	4,879		433	X
02293	Fourmile 94	C	156		15	
02379	Fourmile Ranch	I	7,595		623	X
12070	Fowler Draw	C	151		18	X
12088	Freeman Camp	C	800		32	
02391	Freeman Draw	M	2,710		445	
12079	Gammon Draw	C	37		9	
22112	Garber Victor Et Al	C	280		62	
02306	Gardner Lake	C	40		13	X
02476	Gardner Mt. (South)	M	1,622	AMP Implemented	193	X
02336	Gates-Yonkee	C	560		86	X
22120	Gibbs Brothers	C	95		12	
12085	Goble Draw	C	478		48	X
12226	Gold Mine Road	C	494		63	
22121	Gordon	M	6,674		761	X
02335	Gordon Creek	I	2,118		285	
02428	Gosney Airstrip	C	40		2	X
02395	Gosney, Elmer	C	278		61	X
12193	Government Draw	M	3,590		380	X
02421	Grandma's Bend	C	84		14	X
02360	Gray Cabin Draw	C	2,230		270	X
12174	Green Draw	C	160		29	X
32003	Green Hill	C	40		5	X
02469	Grub Draw	I	10,120		1019	X
22129	Hamm Don Robert	C	362		77	X
12154	Hampshire	C	1,144		129	X
12134	Harlan James S	C	441		24	
14812	Harper Reservoir	C	23		2	X
12147	Hat Ranch	M	6,573		493	X
32002	Hay Creek	C	80		26	X
02440	Healy	C	280		35	X
12153	Hepp Charles	M	2,404		228	X
12231	Hilight	C	40		8	

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Permitted Use (AUMs)	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
02443	Hill Prong	C	80		13	X
2213	Hines	C	120		24	X
12180	Hoblit	C	140		23	X
12169	Hoe Ranch	I	15,279		1676	X
02393	Hole In The Wall	I	9,000		738	X
22116	Holler Draw	C	482		62	X
02410	Homestead Draw 4150’	C	80		11	X
10342	Hope	I	3,423	AMP Implemented	555	X
12240	Horse Creek	M	1,110		231	X
02434	Horse Creek	C	2,071		427	X
02434	Horse Creek/ Pipeline	C	40		8	X
02327	Horseshoe Ranch	C	880		24	
02461	HQ and Taylor Spring	C	912		101	X
02415	Indian Creek	M	2,587		301	X
02274	Ivy Creek	C	83		8	X
12061	Jackplane	C	2,664		266	X
02394	Jeep Trail	C	200		20	X
02320	Jeffers Draw	C	39		6	X
12158	Jiggs Reservoir	C	117		28	X
02257	Jim Crow Creek	C	597		113	X
02460	Johnson Creek	C	354		31	
02401	Johnson Draw	C	2,288		232	
02382	Jones Draw	C	40		6	
02447	K Ranch	C	1,361		187	
12148	Kaycee L and L	C	761		43	
02251	Keathley Draw	C	385		39	X
12178	Kendrick	M	5,351		874	X
02277	Keyes Draw	C	79		9	X
22202	Kingsbury/ Wild Horse	C	160		32	X
12038	Kline Draw	C	400		43	X
12056	Kurtley Draw	C	1,277		135	
02364	Lanabaugh No. 4 Draw	C	40		10	
02301	Larey Draw	C	2,310		385	X
02347	Lariat	C	200		20	
22108	Larrechea	C	280		48	X
12190	Lawrence Charles	C	2838		285	X

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Permitted Use (AUMs)	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
12188	Lawrence Land Co. Inc	C	165		19	X
12023	Lawver	M	4646		815	X
12194	Legerski Ranch	C	359		72	
02325	Linch	C	1441		173	X
12197	Linch	C	80		15	
02305	Linn Draw	C	1440		236	X
12198	Little Bighorn Ranch	C	40		8	
12233	Little Cedar Draw	C	200		28	X
32007	Little Poison Creek	C	2244		218	
02358	Little Powder River	M	3711		750	X
02279	Little Rawhide	C	40		10	X
02310	Little Willow	I	6080	AMP Implemented	823	X
02307	Little Youngs Creek	C	169		34	X
22123	Lone Tree	C	40		7	X
02343	Long Draw	C	719		99	X
02466	Lower Willow Glen	C	80		11	
02355	LX Bar	C	1,230		126	X
02368	Mark Gordon	C	1,282		132	X
02445	Marton	C	41		7	
02309	Mary Straatsma Est.	C	40		6	X
22221	Maycock Draw	I	719		72	X
02406	Mayer	C	98		12	X
02346	Mayor	C	3,157		384	
12032	Mayoworth S. of SDW	C	240		20	X
02370	Meadow Creek	M	2,355		248	X
02303	Meadow Draw	C	160		16	
12227	Michelena	M	3,405	AMP Proposed	348	X
22055	Mickelberry Creek	C	160		16	
12030	Middleberry Draw	C	1,778		178	
14952	Mitchell Breaks	M	2,268	AMP Implemented	391	
02429	Mitchell Draw	M	4,306		419	X
12140	Montgomery	C	1,861		204	X
00749	Moore Reservoir	C	40		8	X

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Permitted Use (AUMs)	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
12235	Moore, James R	C	3,971		782	X
02408	Moriarty, Jack L.	C	40		8	X
02435	Morris Draw	C	1,272		144	X
22029	Mosier Gulch	M	160		41	
02373	Mountain	I	8,390	AMP Implemented	778	X
02446	Mountain	C	1,846		223	
02449	Mountain (Elm)	C	241		35	
02338	Mountain East	C	260		26	
02367	Mud Spring Creek	C	80		16	
22223	Muddy Creek	C	40		18	
22128	Mumma Draw	C	240		54	X
02354	Murray Draw	C	40		8	X
02362	N Fork 9 Mile Creek	C	283		40	
02431	N Gray Cabin Creek	C	723		87	X
32014	N Windmill	I	2,074	AMP Implemented	276	X
02418	N. Fork Powder R.	C	212		34	
02340	N. Leiter	C	117		40	X
02444	N. Scotch	C	201		83	
02092	N. Cottonwood Cr.	C	79		23	X
02348	Napier	M	3,242		529	X
12095	Neil Butte	C	40		6	X
12238	Niedringhaus Lambert	C	440		24	
02425	Ninemile	C	40		5	X
12081	Nipple Butte	C	1,928		389	X
02239	Norfolk John	M	1,840		299	
22119	North Mitten	C	103		21	X
02363	North Ridge	C	335		57	
02295	North Trabing	M	560		78	
02436	North-West Iberlin	C	320		32	X
22008	Number Two Draw	C	1,078		170	X
02457	OK Creek	C	2,302	AMP Implemented	216	X
02390	Olmstead	I	832		179	X
02058	Olsen Draw	C	4,862		592	X
02249	Osborn	C	280		39	X

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Permitted Use (AUMs)	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
02287	Padlock Ranch Co.	C	440		88	X
12068	Pass Reservoir	C	1,225		118	X
02405	Peterson Draw	C	2,736		335	X
12156	Petrified Tree	M	1,867		218	X
12159	Phinney Draw	C	878		91	X
02413	Pine Ridge	C	720		76	X
12166	Pine Ridge	C	240		49	
02454	Pine Ridge	C	320		27	X
02256	Pinette Draw	C	200		48	X
12229	Piney Creek	C	40		7	X
02252	Ploesser	C	385		38	X
02472	Plosser	C	415		47	X
02441	Plum Creek Draw	C	390		84	X
32012	Pointed Butte	C	40		11	X
12195	Poison Creek	M	1,315		148	
02419	Poker Creek	I	3,697	AMP Implemented	837	X
02404	Pollard Draw	C	798		79	
02430	Powder River	I	4,526	AMP Implemented	944	X
02260	Powder River Ranch	I	17,085		1,779	X
02422	Prairie Creek	C	38		13	X
02350	Prong	C	534		92	X
12164	Prong Spotted Horse	C	2,129		271	X
2226	Pugsley Hill	C	40		6	X
12138	Pumpkin Creek	I	13,325		1,454	X
12172	Quinn, John, Bonnie	C	40		7	X
02264	Rafter L	C	1,514		238	X
02266	Ramsbottom	M	7,189		430	X
02319	Rattlesnake Creek	C	40		12	X
12098	Rattlesnake Spring	C	432		46	X
12040	RBL	C	360		43	X
12171	Read Draw	C	40		4	
02269	Reculusa	C	160		42	
12051	Red Canyon	C	2,264		270	X
02365	Red Draw	M	2,115		128	
12033	Red Fork	I	10,000	AMP Implemented	917	X
02409	Red Fork Mtn Camp	C	203		7	
02253	Red Hills	C	759		127	X

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Permitted Use (AUMs)	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
02416	Red Wall	C	459	AMP Implemented	78	X
02271	Reece Ernest	M	2,715		414	X
02330	Reel	C	40		6	X
02275	Remington Creek	M	2,676	AMP Implemented	290	X
02385	Reno	C	160		16	
02268	Reno Draw	C	558		63	X
22205	Robinson Draw	C	69		9	
12155	Robinson Place	C	630		68	X
02329	Rochelle Hills	C	80		12	
12087	Rock Ridge	C	1,360		93	
02321	Rocky Butte	C	2,075		367	X
12118	Rosie Draw	C	200		29	
02491	Rossnecker Draw	C	42		6	X
02278	Rourke & Offutt	C	477		125	X
02263	Rozet	C	40		8	X
02465	Ryan	C	160		46	X
02259	S. Wyodak	C	120		32	X
02386	S. Fork Otter Creek	C	120		17	
22203	S. Leiter	C	1,457		146	X
02372	S.F. Crazy Woman	C	80		14	
02281	S.F. Three Bar	C	215		43	X
22110	Sahara Draw	C	120		20	
02411	Salt Creek	M	4,249		551	X
02272	Sand Rock/Hoe Creek	C	74		11	
00743	Sawmill	C	240		12	
12185	Schiermiester	C	800		114	X
22122	School Sec Dr/Mdlfrk	C	160		27	X
12073	School Section Draw	C	478		43	X
22214	Schoonover Ranch	I	12,482	AMP Implemented	1,528	X
12137	Scotch	C	200		10	
02353	Scott Draw	C	306		32	X
02286	Scott Marion	C	560		124	X
12083	Scotty Draw	C	4,500		624	X
02276	Se of Buffalo Creek	C	1140		152	X
02369	Senff Ditch	C	80		13	X
02463	SF Holler Draw	C	280		26	X

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Permitted Use (AUMs)	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
02375	S. Fork Arkansas Creek	C	200		36	
02292	Simpson, John H	C	1,156		198	X
02471	Sioux Battle	C	241		26	
02459	Sippie Mine	C	250		53	X
02291	Skidmore Estate	C	26		9	
02371	Slope	I	3,960	AMP Implemented	1,044	X
02399	Slope/ Mountain	C	2,032		256	
02297	Smith	C	322		34	
02300	Smith	C	120		23	X
32010	Smith Creek	C	160		10	X
02383	Smith Cut	C	3,235		615	X
02294	Soldier Creek Ranch	C	1,343		229	
02495	Sony Draw	M	5,101		513	X
02498	South Carpenter Draw	C	240		2	X
02451	South Fork	I	7,433		726	X
02389	South Fork Powder R.	M	4,890		380	X
02280	South Middle Butte	C	639		67	X
12183	South Middle Prong	C	640		73	X
02467	South Sussex Stkrst	C	27		14	
00744	South Tabletop	C	120		15	
02296	South Trabing	M	1,039		111	X
02351	South Twin Creek	C	200		33	X
22220	Spellman	C	1,278		163	X
02477	Spotted Horse Creek	C	961		105	X
02241	Spring Creek	C	1,231		287	X
22025	Squaw Butte	C	40		11	X
02298	Squaw Creek	M	2,566		289	X
02255	Stateline	C	71		18	X
12131	Steel Creek	C	200		20	
02308	Stephenson, Marie	C	80		20	
02387	Stone Draw	C	80		20	X
12160	Stotts Draw	C	1,934		193	

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Permitted Use (AUMs)	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
02312	Stuart, James R.	C	80		16	X
02403	Stubbs Draw	C	493	AMP Implemented	69	
02313	Suel Anna Trustee	C	200		40	
12167	Sussex Cutoff	I	1,318		105	
12133	Sussex Oil Company	C	920		46	
02420	Sussex Stockrest	I	305		50	
02316	Swartz, Edward H.	M	2,480		621	X
02438	T.W.	I	1,840	AMP Implemented	184	X
12141	Tabletop	C	80		8	
12145	Tarver Trust	C	689		128	X
02458	TD Southwest	C	120		20	X
02333	Thom Brothers	C	31		4	
02349	Three Mile Creek	C	441		90	X
12101	Threemile Creek Reservoir	C	80		18	
02337	Throne John and Earl	C	120		24	X
02432	Timar East	C	1,122		116	X
12199	Timber Draw	C	74		10	X
02494	Tipperary	C	360		38	X
22213	Tongue River	I	1,767	AMP Implemented	476	X
02339	Trail Creek	M	7,244		2,624	X
02417	Trail Side	C	40		14	
12043	Trough Draw	C	760		34	X
00697	Truman Draw	M	2,032		347	X
02282	TTT	M	14,155		1,563	X
02456	Tuttle Draw	C	320		92	X
02470	Tuttle Draw/ Deep Crk	C	554		154	X
12187	Twenty Mile Creek	I	6,100		808	X
12142	Tyree Place	C	40		8	
02448	Upper Cabin Creek	C	240		43	X
02273	Upper Fort Creek	C	920		205	X
12152	Upper Grub	C	1,340		164	X

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Permitted Use (AUMs)	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
12207	Upper Kaufman Draw	M	1,920		262	X
12163	Ute Creek	C	117		17	
02284	V Bar F	M	2,797		364	X
02345	Vanderhoff	C	360		26	
02311	Vanhouten	M	1,057		107	X
12077	W. Sussex (Hickey)	I	3,320		483	
02381	Wagensen Don et al	C	80		20	X
22106	Wagonhammer	M	3,881	AMP Implemented	1,352	X
02492	Walker Draw	C	440		48	X
12146	Wall (East)	C	1840		247	
22104	Walsh	C	340		34	
02304	Washout Dr.	M	1,859		315	X
02318	Water Gap Draw	M	9,043		1,127	X
02356	Watt ranch	C	46		6	
12181	West Bowman Hill	C	2,311		522	X
02490	West Coutant Creek	C	80		14	
02462	West Fork	C	240		26	X
12091	West Timber Creek	C	240		32	X
02170	West Timber Draw	C	960		100	X
12063	Weston SW	M	4,435		829	X
02326	White Rock	C	440		58	X
02247	White Tail Creek	C	200		62	X
12237	Whitetail Creek	M	3,391		751	X
22222	Whitetail Pines	M	1,493		299	X
02455	Whitmeyer	C	120		21	
02302	Whitmeyer Creek	C	40		6	
12082	Wild Horse Creek	C	120		24	
32015	Wild Horse Creek	C	80		8	X
02283	Wildcat	C	80		16	X
10069	Willow Creek	I	26,822		4,412	X
12036	Willow Creek	C	2,715		462	X
02331	Winter Draw	C	40		6	
12216	Wolf Mountain	C	515		57	

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Permitted Use (AUMs)	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
02380	Wormwood Ranch	I	20,699	AMP Implemented	2,497	X
12042	Wyarno	C	120		24	
02334	Wythom Road	C	120		20	X
12150	Yellowhammer	M	1,776		206	X

AMP Allotment Management Plan
AUM Animal Unit Month
C Custodial
I Improve
M Maintain

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Appendix F. Maps

Maps referenced in the Proposed RMP and Final EIS are included in hardcopy at the end of Volume 3.

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Map 2. Federal Mineral Estate in the Planning Area

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Map 73. ACECs, BCBs, and Lands with Wilderness Characteristics - Alternative B

Map 74. ACECs, BCBs, and Lands with Wilderness Characteristics - Alternative D

Map 75. Special Designations - WSAs and WSRs - All Alternatives

Map 76. Fortification Creek Planning Area - All Alternatives

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Appendix G. Surface Disturbance and Reasonable Foreseeable Actions

This appendix includes tables that provide information on surface disturbance and reasonable foreseeable actions within the planning area. Table G.1, "RFA-1A Reasonable Foreseeable Development Assumptions: Oil and Gas" (p. 1938) and Table G.2, "RFA-1B Reasonable Foreseeable Development Assumptions: Other Resource Uses" (p. 1942) provide foreseeable development project assumptions by resource. Table G.3, "RFA-2 Summary of Projected Acres of Surface Disturbance by Resource" (p. 1946) provides projected acres of surface disturbance by resource; the projected surface disturbances in Table G.3, "RFA-2 Summary of Projected Acres of Surface Disturbance by Resource" (p. 1946) are based on the project assumptions in Table G.1, "RFA-1A Reasonable Foreseeable Development Assumptions: Oil and Gas" (p. 1938) and Table G.2, "RFA-1B Reasonable Foreseeable Development Assumptions: Other Resource Uses" (p. 1942).

The well count projections in Table G.1, "RFA-1A Reasonable Foreseeable Development Assumptions: Oil and Gas" (p. 1938) are derived from the Reasonable Foreseeable Development Scenario (RFD) for Oil and Gas prepared by the BLM Wyoming State Office Reservoir Management Group. The RFD projects future development potential and activity based on a technical analysis of the oil and gas resource known to occur and potentially occurring within the planning area, published industry reports, and input from local oil and gas operators and other federal and state agencies. The difference in projected well counts between each alternative is a result of proposed management action and constraints, mitigation measures, and Best Management Practices that may affect the level of oil and gas development under each alternative. Additional information regarding the assumptions used to develop projections for oil and gas activity can be found in the RFD Scenario for Oil and Gas which is available on the Buffalo Resource Management Plan (RMP) revision website.

The BLM developed the assumptions and projections in Table G.2, "RFA-1B Reasonable Foreseeable Development Assumptions: Other Resource Uses" (p. 1942) based on BLM Interdisciplinary Team knowledge, historical and existing activity for all programs, and current project proposals. The difference in assumptions between alternatives is based on the proposed management actions and associated restrictions and stipulations under each alternative.

Table G.1. RFA-1A Reasonable Foreseeable Development Assumptions: Oil and Gas

Type of Development	Alternative A	Alternative B	Alternative C	Alternative D
Mineral Resources – CBNG				
Federal CBNG Well Projections				
Existing Productive Federal CBNG Wells				
Number of Existing Federal CBNG Wells	9,211	9,211	9,211	9,211
Projected Number of Abandoned Existing Federal CBNG Wells	9,211	9,211	9,211	9,211
Remaining Number of Existing Productive Federal CBNG Wells	0	0	0	0
Projected New Federal CBNG Wells				
Number of Projected New Federal CBNG Wells	903	101	5,280	2,721
Projected Number of Abandoned New Federal CBNG Wells	314	35	1,836	946
Projected Productive New Federal CBNG Wells	589	66	3,444	1,775
Projected Total Productive Federal CBNG Wells				
Remaining Number of Existing Productive Federal CBNG Wells	0	0	0	0
Projected Productive New Federal CBNG Wells	589	66	3,444	1,775
Total Number Productive Federal CBNG Wells	589	66	3,444	1,775
Non-federal CBNG Well Projections (State and Fee Minerals)				
Existing Productive Non-federal CBNG Wells				
Number of Existing Non-federal CBNG Wells	16,853	16,853	16,853	16,853
Projected Number of Abandoned Non-federal CBNG Wells	16,853	16,853	16,853	16,853
Remaining Number of Existing Productive Non-federal CBNG Wells	0	0	0	0

Type of Development	Alternative A	Alternative B	Alternative C	Alternative D
Projected New Non-federal CBNG Wells				
Number of Projected New Non-federal CBNG Wells	4,987	4,987	4,987	4,987
Projected Number of Abandoned New Non-federal CBNG Wells	1,734	1,734	1,734	1,734
Projected Productive New Non-federal CBNG Wells	3,253	3,253	3,253	3,253
Projected Total Productive Non-federal CBNG Wells				
Remaining Number of Existing Productive Non-federal CBNG Wells	0	0	0	0
Projected Productive New Non-federal CBNG Wells	3,253	3,253	3,253	3,253
Total Number Productive Non-federal CBNG Wells	3,253	3,253	3,253	3,253
Cumulative CBNG Productive Wells				
Total Number Productive Federal CBNG Wells	589	66	3,444	1,775
Total Number Productive Non-federal CBNG Wells	3,253	3,253	3,253	3,253
Total Productive CBNG Wells	3,842	3,319	6,697	5,028
Mineral Resources – Conventional Oil and Gas				
Federal Conventional Well Projections				
Existing Productive Federal Conventional Wells				
Number of Existing Federal Conventional Wells	2,189	2,189	2,189	2,189
Projected Number of Abandoned Existing Federal Conventional Wells	882	882	882	882
Remaining Number of Existing Productive Federal Conventional Wells	1,307	1,307	1,307	1,307
Projected New Federal Conventional Wells				
Number of Projected New Federal Conventional Wells	1,828	7	1,990	1,773
Projected Number of Abandoned New Federal Conventional Wells	92	1	100	88

Type of Development	Alternative A	Alternative B	Alternative C	Alternative D
Projected Productive New Federal Conventional Wells	1,736	6	1,890	1,685
Projected Total Productive Federal Conventional Wells				
Remaining Number of Existing Productive Federal Conventional Wells	1,307	1,307	1,307	1,307
Projected Productive New Federal Conventional Wells	1,736	6	1,890	1685
Total Number Productive Federal Conventional Wells	3,043	1,313	3,197	2,992
Non-federal Conventional Well Projections (State and Fee Minerals)				
Existing Productive Non-federal Conventional Wells				
Number of Existing Non-federal Conventional Wells	1,944	1,944	1,944	1,944
Projected Number of Abandoned Non-federal Conventional Wells	727	727	727	727
Remaining Number of Existing Productive Non-federal Conventional Wells	1,217	1,217	1,217	1,217
Projected New Non-federal Conventional Wells				
Number of Projected New Non-federal Conventional Wells	1,875	1,875	1,875	1,875
Projected Number of Abandoned New Non-federal Conventional Wells	94	94	94	94
Projected Productive New Non-federal Conventional Wells	1,781	1,781	1,781	1,781
Projected Total Productive Non-federal Conventional Wells				
Remaining Number of Existing Productive Non-federal Conventional Wells	1,217	1,217	1,217	1,217
Projected Productive New Non-federal Conventional Wells	1,781	1781	1781	1781

Type of Development	Alternative A	Alternative B	Alternative C	Alternative D
Total Number Productive Non-federal Conventional Wells	2,998	2,998	2,998	2,998
Cumulative Conventional Productive Conventional Wells				
Total Number Productive Federal Conventional Wells	3,043	1,313	3,197	2,992
Total Number Productive Non-federal Conventional Wells	2,998	2,998	2,998	2,998
Total Productive Conventional Wells	6,041	4,311	6,195	5,990
Cumulative Productive Wells				
Total Number Productive CBNG Federal Wells	589	66	3,444	1,775
Total Number Productive Conventional Federal Wells	3,043	1,313	3,197	2,992
Total Number Productive Federal Wells	3,632	1,379	6,641	4,767
Total Number Productive CBNG Non-federal Wells	3,253	3,253	3,253	3,253
Total Number Productive Conventional Non-federal Wells	2,998	2,998	2,998	2,998
Total Number Productive Non-federal Wells	6,251	6,251	6,251	6,251
Total Productive Wells	9,883	7,630	12,892	11,018
CBNG Coalbed Natural Gas RFA Reasonable Foreseeable Action				

Table G.2. RFA-1B Reasonable Foreseeable Development Assumptions: Other Resource Uses

Type of Development	Alternative A	Alternative B	Alternative C	Alternative D
PHYSICAL RESOURCES				
Cave and Karst				
Gating of Specific Caves	No Previous	2	0	0
Cave Inventory	No Previous	Entire field office	None	Entire field office
Interpretive Signs	No Previous	5	0	3
Cave Registers	No Previous	5	0	3
Cave Management Plans	No Previous	All caves	Specific caves	All caves
MINERAL RESOURCES				
Mineral Resources - Locatable				
Exploration for Locatable Minerals (numbers of Notices and acres disturbed)	4 Notices/2 acres	2 Notices/1 acre	11 Notices/5.25 acres	9 Notices/4.5 acres
Development of Locatable Minerals (numbers of POOs and acres disturbed)	4 POOs/554 acres	4 POOs/277 acres	11 POOs/1,455 acres	9 POOs/1,252 acres
Mineral Resources – Leasable Coal				
Exploration for Coal (number of licenses and acreage disturbed)	65 licenses/700 acres	60 licenses/600 acres	65 licenses/700 acres	65 licenses/700 acres
Development of Coal (number of leases and net acreage disturbed by mining, i.e., new disturbance – new reclamation)	28 new leases (106,400 acres) to existing mine operators.	28 new leases (106,400 acres) to existing mine operators.	28 new leases (106,400 acres) to existing mine operators.	28 new leases (106,400 acres) to existing mine operators.
Development of Coal by Non-conventional Means (in place conversion) – number of authorizations and new acreage disturbed	No authorization policy	0/0	20 authorizations/0	No authorization policy
Mineral Resources – Leasable Geothermal				
Geothermal Development (number of leases and acres)	0/0	0/0	0/0	0/0
Mineral Resources – Other Leasable Minerals				
Development of Other Leasable Minerals (number of leases and acres)	0/0	0/0	0/0	0/0
Mineral Resources - Salable				

Type of Development	Alternative A	Alternative B	Alternative C	Alternative D
Exploration for Salable Minerals (numbers of exploration sites and acres disturbed)	4 exploration sites/2 acres	1 exploration site/0.43 acre	16 exploration sites/ 7.89 acres	9 exploration sites/ 4.5 acres
Development of Salable Minerals (numbers of disposal operations and acres disturbed)	61 operations/ 530 acres	27 operations/ 114 acres	240 operations/ 2,090 acres	137 operations/ 1,193 acres
FIRE AND FUELS MANAGEMENT				
Prescribed Fire (acreage)	14,000	3,500	42,000	14,000
Mechanical Fuels Management (acreage)	0	0	0	0
BIOLOGICAL RESOURCES				
Forests, Woodlands, and Forest Products				
Forest Products Sales (acreage)	200 to 300 acres annually or 4,000 to 6,000 acres for lifetime of plan or 20 years	10 to 50 acres annually or 200 to 1,000 acres for lifetime of plan or 20 years	800 to 1,200 acres annually or 16,000 to 24,000 acres for lifetime of plan or 20 years	800 to 1000 acres annually or 16,000-20,000 acres for the lifetime of the plan
Invasive Species (treatment acres based on disturbance for other resources)				
Range Improvement Projects (acreage)	8	34	17	24
Prescribed Fire (acreage)	420	2,800	12,600	420
BLM Road Maintenance (miles/acreage)	0.5 mile/4 acres	2 miles/12 acres	1 mile/7 acres	1 mile/7 acres
Forests and Woodlands (acreage)	120	100	1,200	1,000
Not Associated with any Surface Disturbance (acreage)	8,000	15,000	10,000	12,000
Federal Oil and Gas Well Activities (acreage)	Short term: 16,473 Long term: 4,250	Short term: 9,423 Long term: 3,212	Short term: 15,343 Long term: 5,412	Short term: 16,473 Long term: 4,250
Renewable Energy Projects (acreage)	2,020	4,040	16,080	6,060
Rights-of-way (miles/acreage)	274 miles/1,990 acres	150 miles/1,094 acres	406 miles/2,953 acres	274 miles/1,990 acres
Fish and Wildlife Resources				
Wildlife Habitat Restoration and Enhancement: Mountain Mahogany (acreage)	0	8,714	0	8,714
Wildlife Habitat Restoration and Enhancement: Greater Sage-Grouse (acreage)	0	156,420	0	77,560

Type of Development	Alternative A	Alternative B	Alternative C	Alternative D
Watershed Restoration and Enhancement (acreage)	0	0	0	0
Stream Restoration, Structure Removal, and Other Fisheries Enhancements (number of sites and acreage)	80 structures in <1 mile of stream. (one site)/2 acres	20 sites/20 acres	0/0	20 sites/20 acres
HERITAGE AND VISUAL RESOURCES				
Paleontological				
Fossil Collection (acreage)	0	0	0	0
LAND RESOURCES				
Renewable Energy				
Wind-Energy Testing – MET Towers (number of sites and acreage)	200 sites/200 acres	50 sites/50 acres	200 sites/200 acres	80 sites/240 acres
Wind-Energy Development (number of sites and acreage)	20 sites/ up to 20,000 acres	5 sites/5,000 acres	20 sites/ up to 40,000 acres	30 sites/up to 75,000 acres
Rights-of-Way				
Communication Site Development (number of sites/acreage)	56 sites/28 acres	28 sites/5 acres	84 sites/38 acres	56 sites/28 acres
Powerline Development (number of sites and miles/acreage)	740 rights-of-way/ 1,000 miles/ 3,600 acres	500 rights-of-way/ 425 miles/ 1,546 acres	1,500 rights-of-way/ 1,200 miles/ 4,400 acres	740 rights-of-way/ 1,000 miles/ 3,600 acres
Pipeline Development – Total Number of Projects	1,400	400	2,000	1,400
Road Development (number of sites and miles/acres)	1,100 rights-of-way/ 1,725 miles/ 6,275 acres	550 rights-of-way/ 575 miles/ 2,090 acres	1,650 rights-of-way/ 2,300 miles/ 8,364 acres	1,100 rights-of-way/ 1,725 miles/ 6,275 acres
Compressor Stations (number of sites/acreage)	52 sites/200 acres	26 sites/38 acres	78 sites/114 acres	52 sites/76 acres
Travel and Transportation Management				
Road Maintenance (miles/acreage)	16.5 miles (Bar C, Billy Creek, Muir, Petrified Tree, and Weston West)/120 acres	16.5 miles (Bar C, Billy Creek, Muir, Petrified Tree, and Weston West)/120 acres	~ 20 miles (Bar C, Billy Creek, Muir, Petrified Tree, and Weston West and new developed routes)/145 acres	20 miles/145 acres
BLM Nonmotorized Trail Creation (miles/acreage)	9 miles/65 acres	2 miles/14 acres	7 miles (Burnt Hollow/Mosier Ext/Etc. Trails)/51 acres	7 miles/50 acres
BLM Public Access Road Creation (miles)	0 miles	1 mile	5 Miles (Middle Fork/other access roads)	5 miles
Recreation				

Type of Development	Alternative A	Alternative B	Alternative C	Alternative D
Campsites (number of sites/acreage)	0/0	0/0	10/20	8/16
Interpretive Sites (number of sites/acreage)	1/2	0/0	5/2.5	5/2.5
Other Facilities (number of sites/acreage)	3/3	0/0	3/3	3/3
Livestock Grazing Management				
Reservoir/Pit Development (number of sites/acreage)	0/0	0/0	0/0	0/0
Well Development (number of sites/acreage)	4/<1	4/<1	4/<1	6/<1
Spring Development (number of sites/acreage)	40/4	40/4	40/4	42/4
Fence Development (number of sites/miles)	100/100	150/150	150/150	200/200
Reservoir Conversion from CBNG Development/water disposal to Range Improvement (acreage)	150	150	150	150

BLM Bureau of Land Management
CBNG Coalbed natural gas
POO Plan of Operations
RFA Reasonable Foreseeable Action

Table G.3. RFA-2 Summary of Projected Acres of Surface Disturbance by Resource

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
MINERAL RESOURCES				
Mineral Resources – Locatable Exploration				
Acres Disturbed from BLM Actions	2	1	5.25	4
Acres Reclaimed from BLM Actions	2	1	5.25	4
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Disturbed from Non-BLM Actions	200	600	300	450
Acres Reclaimed from Non-BLM Actions	200	600	300	450
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
Mineral Resources – Locatable Development				
Acres Disturbed from BLM Actions	554	277	1,455	1,252
Acres Reclaimed from BLM Actions	144	72	378	329
Acres Long-Term Disturbance from BLM Actions	410	205	1,077	923
Acres Disturbed from Non-BLM Actions	7,789	23,368	11,684	17,525
Acres Reclaimed from Non-BLM Actions	2,025	6,076	3,038	4,556
Acres Long-Term Disturbance from Non-BLM Actions	5,764	17,292	8,646	12,969
Mineral Resources - Leasable Coal (It is assumed that the only solid leasable will be coal – all other solid leasable minerals activity is projected to be possible, but insignificant compared to coal activity over the planning horizon.)				
Acres Disturbed from BLM Actions	195,700	186,600	195,700	195,700
Acres Reclaimed from BLM Actions	120,700	120,600	120,700	120,700
Acres Long-Term Disturbance from BLM Actions (long-term mining facilities)[1]	75,000	66,000	75,000	75,000

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Acres Disturbed from Non-BLM Actions	10,000	10,000	10,000	10,000
Acres Reclaimed from Non-BLM Actions	6,000	6,000	6,000	6,000
Acres Long-Term Disturbance from Non-BLM Actions (long-term mining facilities)[2]	4,000	4,000	4,000	4,000
Mineral Resources – Leasable Geothermal				
Acres Disturbed from BLM Actions	0	0	0	0
Acres Reclaimed from BLM Actions	0	0	0	0
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Disturbed from Non-BLM Actions	0	0	0	0
Acres Reclaimed from Non-BLM Actions	0	0	0	0
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
Mineral Resources – Leasable Oil and Gas (Coalbed Natural Gas only)				
Acres Disturbed from BLM Actions	2,258	253	13,200	6,803
Acres Reclaimed from BLM Actions	903	101	5,280	2,721
Acres Long-Term Disturbance from BLM Actions	1,355	152	7,920	4,082
Acres Disturbed from Non-BLM Actions	12,468	12,468	12,468	12,468
Acres Reclaimed from Non-BLM Actions	4,987	4,987	4,987	4,987
Acres Long-Term Disturbance from Non-BLM Actions	7,481	7,481	7,481	7,481
Mineral Resources – Leasable Oil and Gas (Conventional only)				
Acres Disturbed from BLM Actions	8,317	33	9,055	8,066
Acres Reclaimed from BLM Actions	5,575	22	6,070	5,406

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Acres Long-Term Disturbance from BLM Actions	2,742	11	2,985	2,660
Acres Disturbed from Non-BLM Actions	8,531	8,531	8,531	8,531
Acres Reclaimed from Non-BLM Actions	5,719	5,719	5,719	5,719
Acres Long-Term Disturbance from Non-BLM Actions	2,812	2,812	2,812	2,812
Mineral Resources – Salable Exploration				
Acres Disturbed from BLM Actions	2	0.43	7.89	4.5
Acres Reclaimed from BLM Actions	2	0.43	7.89	4.5
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Disturbed from Non-BLM Actions	200	600	300	450
Acres Reclaimed at Non-BLM Actions	200	600	300	450
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
Mineral Resources – Salable Development				
Acres Disturbed from BLM Actions	530	114	2,090	1,193
Acres Reclaimed from BLM Actions	99	21	392	224
Acres Long-Term Disturbance from BLM Actions	431	93	1,698	969
Acres Disturbed from Non-BLM Actions	4,568	13,704	6,852	10,728
Acres Reclaimed at Non-BLM Actions	1,188	3,564	1,782	3,123
Acres Long-Term Disturbance from Non-BLM Actions	3,380	10,140	5,070	7,605
FIRE AND FUELS MANAGEMENT				
Prescribed Fire				
Acres Treated from BLM Actions	14,000	3,500	42,000	14,000

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Acres Reclaimed from BLM Actions	14,000	3,500	42,000	14,000
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Treated from Non-BLM Actions	2,000	2,000	2,000	2,000
Acres Reclaimed from Non-BLM Actions	2,000	2,000	2,000	2,000
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
Wildfire – Active Rehabilitation (fire lines, etc.)				
Acres Treated from BLM Actions	27,596	27,596	27,596	27,596
Acres Reclaimed from BLM Actions	27,596	27,596	27,596	27,596
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Treated from Non-BLM Actions	139,042	139,042	139,042	139,042
Acres Reclaimed from Non-BLM Actions	139,042	139,042	139,042	139,042
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
Mechanical Fuels Treatment				
Acres Treated from BLM Actions	0	0	0	0
Acres Reclaimed from BLM Actions	0	0	0	0
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Treated from Non-BLM Actions	3,200	3,200	3,200	3,200
Acres Reclaimed from Non-BLM Actions	3,200	3,200	3,200	3,200
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
BIOLOGICAL RESOURCES				
Forests, Woodlands, and Forest Products				

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Acres Treated from BLM Actions	200 to 300 acres annually or 4,000 to 6,000 acres for lifetime of plan	10 to 50 acres annually or 200 to 1,000 acres for lifetime of plan	800 to 1,200 acres annually or 16,000 to 24,000 acres for lifetime of plan	800 to 1,000 acres annually or 16,000-20,000 acres for the lifetime of the plan
Acres Reclaimed from BLM Actions	200 to 300 acres annually or 4,000 to 6,000 total acres	10 to 50 acres annually or 200 to 1,000 total acres	800 to 1,200 acres annually or 16,000 to 24,000 total acres	800 to 1,000 acres annually or 16,000-20,000 acres for the lifetime of the plan
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Treated from Non-BLM Actions	4,055	2,832	80,910	10,000
Acres Reclaimed from Non-BLM Actions	4,055	2,832	80,910	10,000
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
Invasive Species				
Acres Treated Disturbance from BLM Actions	8,000	15,000	10,000	12,000
Acres Reclaimed from BLM Actions	7,000	13,000	8,500	10,500
Acres Long-Term Disturbance from BLM Actions	1,000	2,000	1,500	1,500
Acres Treated from Non-BLM Actions	40,000	70,000	55,000	63,000
Acres Reclaimed from Non-BLM Actions	38,000	66,000	52,000	59,500
Acres Long-Term Disturbance from Non-BLM Actions	2,000	4,000	3,000	3,500
Fish and Wildlife Resources				
Wildlife Habitat Enhancements Activities				
Acres Treated from BLM Actions	0	165,134	0	86,274
Acres Reclaimed from BLM Actions	0	165,134	0	86,274
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Treated from Non-BLM Actions	1,414,888	1,414,888	1,414,888	1,414,888
Acres Reclaimed from Non-BLM Actions	1,414,888	1,414,888	1,414,888	1,414,888

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
Fisheries, Watershed, and Stream Enhancement Activities				
Miles/Acres Treated from BLM Actions	1.5/20	10/12	0	1.5/20
Acres Reclaimed from BLM Actions	20	12	0	20
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Miles/Acres Treated from Non-BLM Actions	12/145	81/980	0	12/145
Acres Reclaimed from Non-BLM Actions	145	980	0	145
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
HERITAGE AND VISUAL RESOURCES				
Paleontological				
Acres Disturbed from BLM Actions	100	200	100	100
Acres Reclaimed from BLM Actions	100	200	100	100
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Disturbed from Non-BLM Actions	900	1,800	900	900
Acres Reclaimed from Non-BLM Actions	900	1,800	900	900
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
LAND RESOURCES				
Renewable Energy - Wind-Energy Development				
Acres Disturbed from BLM Actions	20,000	5,000	40,000	240 acres MET Towers (3 year disturbance) and 75,000 acres wind towers and infrastructure
Acres Reclaimed from BLM Actions	17,500	4,500	22,500	240 acres MET Towers and 50,000 acres for buried power and staging

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Acres of Long-Term Disturbance from BLM Actions	2,500	500	17,500	25,000
Acres Disturbed from Non-BLM Actions	161,818	40,455	323,636	161,818
Acres Reclaimed from Non-BLM Actions	141,591	36,409	182,046	141,591
Acres of Long-Term Disturbance from Non-BLM Actions	20,227	4,046	141,590	20,227
Rights-of-Way (ROW)				
Pipelines (Mineral and Water)				
Acres Disturbed from BLM Actions	14,000	5,750	20,000	14,000
Acres Reclaimed from BLM Actions	14,000	5,750	20,000	14,000
Acres of Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Disturbed from Non-BLM Actions	113,272	46,522	161,818	113,272
Acres Reclaimed from Non-BLM Actions	113,272	46,522	161,818	113,272
Acres of Long-Term Disturbance from Non-BLM Actions	0	0	0	0
Roads				
Miles/Acres Disturbed from BLM Actions	1,725/18,550	575/9,275	2,300/27,825	1,035/18,550
Miles/Acres Reclaimed from BLM Actions	500/7,049	125/2,690	800/12,800	250/5,750
Miles/Acres of Long-Term Disturbance from BLM Actions	1,225/11,501	450/6,585	1,500/15,025	785/12,800
Acres Disturbed from Non-BLM Actions	150,086	75,043	225,130	150,086
Acres Reclaimed from Non-BLM Actions	57,033	21,765	103,564	46,523

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Acres of Long-Term Disturbance from Non-BLM Actions	93,054	53,279	121,566	103,564
Powerlines				
Miles/Acres Disturbed from BLM Actions	1,000/4,916	425/2,458	1,200/7,374	1,000/4,916
Miles/Acres Reclaimed from BLM Actions	100/491	42.5/245	120/737	100/491
Miles/Acres of Long-Term Disturbance from BLM Actions	900/4,425	382.5/2,213	1,080/6,637	900/4,425
Acres Disturbed from Non-BLM Actions	39,775	19,887	59,662	39,775
Acres Reclaimed from Non-BLM Actions	3,973	1,982	5,963	3,973
Acres of Long-Term Disturbance from Non-BLM Actions	35,802	17,905	53,699	35,802
Communication Sites				
Acres Disturbed from BLM Actions	56	28	84	56
Acres Reclaimed from BLM Actions	0	0	0	20
Acres of Long-Term Disturbance from BLM Actions	56	28	84	36
Acres Disturbed from Non-BLM Actions	453	227	680	453
Acres Reclaimed from Non-BLM Actions	0	0	0	162
Acres of Long-Term Disturbance from Non-BLM Actions	453	227	680	291
Compressor Sites				
Acres Disturbed from BLM Actions	200	100	300	200
Acres Reclaimed from BLM Actions	0	0	0	40

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Acres of Long-Term Disturbance from BLM Actions	200	100	300	160
Acres Disturbed from Non-BLM Actions	1,618	809	2,427	1,618
Acres Reclaimed from Non-BLM Actions	0	0	0	324
Acres of Long-Term Disturbance from Non-BLM Actions	1,618	809	2,427	1,295
Other Facilities				
Acres Disturbed from BLM Actions	1,040	400	1,500	1,040
Acres Reclaimed from BLM Actions	620	200	750	620
Acres of Long-Term Disturbance from BLM Actions	420	200	750	420
Acres Disturbed from Non-BLM Actions	8,415	3,236	12,136	8,415
Acres Reclaimed from Non-BLM Actions	5,016	1,618	6,068	5,016
Acres of Long-Term Disturbance from Non-BLM Actions	3,398	1,618	6,068	3,398
Travel and Transportation Management				
Nonmotorized Trails				
Miles/Acres Disturbed from BLM Actions	9/65	2/15	7/51	9/65
Miles/Acres Reclaimed from BLM Actions	0/0	0/0	0/0	0/0
Miles/Acres Long-Term Disturbance from BLM Actions	9/65	2/15	7/51	9/65
BLM Public Access Road Creation				
Miles/Acres Disturbed from BLM Actions	0/0	1/7	5/36	2/15
Miles/Acres Reclaimed from BLM Actions	0/0	0/0	0/0	0/0

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Miles/Acres Long-Term Disturbance from BLM Actions	0/0	1/7	5/36	2/15
BLM Public Access Road Reclamation[3]				
Miles/Acres Disturbed from BLM Actions	0/0	0/0	0/0	0/0
Miles/Acres Reclaimed from BLM Actions	0/0	5/36	2/15	5/36
Miles/Acres Long-Term Disturbance from BLM Actions	0/0	0/0	0/0	0/0
Recreation				
Recreational Site Development				
Acres Disturbed from BLM Actions	5	5	20	20
Acres Reclaimed from BLM Actions	0	0	0	0
Acres Long-Term Disturbance from BLM Actions	5	5	20	20
Livestock Grazing Management				
Spring Development				
Acres Disturbed from BLM Actions	4	4	4	4
Acres Reclaimed from BLM Actions	2	2	2	2
Acres Long-Term Disturbance from BLM Actions	2	2	2	2
Acres Disturbed from Non-BLM Actions	1	1	1	1
Acres Reclaimed from Non-BLM Actions	0.5	0.5	0.5	0.5
Acres Long-Term Disturbance from Non-BLM Actions	0.5	0.5	0.5	0.5
Pipeline Development				
Acres Disturbed from BLM Actions	40	40	40	40
Acres Reclaimed from BLM Actions	35	35	35	35

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Acres Long-Term Disturbance from BLM Actions	5	5	5	5
Acres Disturbed from Non-BLM Actions	20	20	20	20
Acres Reclaimed from Non-BLM Actions	18	18	18	18
Acres Long-Term Disturbance from Non-BLM Actions	2	2	2	2
Reservoir/Pit Development				
Acres Disturbed from BLM Actions	0	0	0	0
Acres Reclaimed from BLM Actions	0	0	0	0
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Disturbed from Non-BLM Actions	0	0	0	0
Acres Reclaimed from Non-BLM Actions	0	0	0	0
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
Fence Development				
Miles/Acres Disturbed from BLM Actions	80/70	120/100	120/100	150/38
Miles/Acres Reclaimed from BLM Actions	57/50	84/70	84/70	140/35
Miles/Acres Long-Term Disturbance from BLM Actions	23/20	36/30	36/30	10/3
Miles/Acres Disturbed from Non-BLM Actions	20/15	30/25	30/25	50/13
Miles/Acres Reclaimed from Non-BLM Actions	13/10	24/20	24/20	45/11
Miles/Acres Long-Term Disturbance from Non-BLM Actions	7/5	6/5	6/5	5/2
Well Development				
Acres Disturbed from BLM Actions	<1	<1	<1	<1

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Acres Reclaimed from BLM Actions	0	0	0	0
Acres Long-Term Disturbance from BLM Actions	<1	<1	<1	<1
Acres Disturbed from Non-BLM Actions	<1	<1	<1	<1
Acres Reclaimed from Non-BLM Actions	0	0	0	0
Acres Long-Term Disturbance from Non-BLM Actions	<1	<1	<1	<1
Reservoir Maintenance Development				
Acres Disturbed from BLM Actions	0	0	0	0
Acres Reclaimed from BLM Actions	0	0	0	0
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Disturbed from Non-BLM Actions	0	0	0	0
Acres Reclaimed from Non-BLM Actions	0	0	0	0
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
CUMULATIVE DISTURBANCE[4]				
Total Acres Disturbed from BLM Actions	322,026	422,903	422,544	486,957
Total Acres Reclaimed from BLM Actions	221,888	344,752	291,923	358,871
Total Acres Long-Term Disturbance from BLM Actions	100,138	78,152	130,621	128,086
Total Acres Disturbed from Non-BLM Actions	2,123,460	1,890,239	2,531,611	2,168,799
Total Acres Reclaimed from Non-BLM Actions	1,943,463	1,766,623	2,174,564	1,965,851
Total Acres Long-Term Disturbance from Non-BLM Actions	179,998	123,617	357,048	202,949

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Cumulative Long-Term Acres of Disturbance	280,135	201,768	487,669	331,035

[1]Of the 75,000 acres of long-term disturbance from BLM actions for alternatives A, C, and D, 45,500 acres are part of the active mine. Of the 66,000 acres of long-term disturbance from BLM actions for Alternative B, 36,500 acres are part of the active mine. The remaining long-term disturbance acreage for all alternatives includes buildings and processing areas.
[2]Of the 4,000 acres of long-term disturbance from non-BLM actions for all alternatives, 2,500 acres are part of the active mine. The remaining long-term disturbance acreage for all alternatives includes buildings and processing areas.
[3]Represents the projected reclamation of existing roads in the planning area. As such, there is no long-term disturbance anticipated from this action. The projected acres reclaimed from this action are not included in the cumulative disturbance acreages.
[4]Numbers may not add up due to rounding.

BLM Bureau of Land Management
RFA Reasonable Foreseeable Action

Appendix H. Fluid Mineral Lease Notices; Lease Stipulations; and the Process for Exceptions, Modifications, and Waivers

H.1. Lease Notices

A lease notice provides more detailed information concerning limitations that already exist in law, lease terms, regulations, or operational orders. A Lease Notice also addresses special items the lessee should consider when planning operations, but does not impose new or additional restrictions (Uniform Format for Oil and Gas Lease Stipulations, March 1989. Rocky Mountain Regional Coordinating Committee). "An information [lease] notice has no legal consequences, except to give notice of existing requirements, and may be attached to a lease by the authorized officer at the time of lease issuance to convey certain operational, procedural or administrative requirements relative to lease management within the terms and conditions of the standard lease form. Information [lease] notices shall not be a basis for denial of lease operations." (43 Code of Federal Regulations [CFR] 3101.1-3). There are four standard lease notices that are attached to every lease issued by the Bureau of Land Management (BLM) within Wyoming (three numbered, and one unnumbered lease notice).

LEASE NOTICE NO. 1

Under Regulation 43 CFR 3101.1-2 and terms of the lease (BLM Form 3100-11), the authorized officer may require reasonable measures to minimize adverse impacts to other resource values, land uses, and users not addressed in lease stipulations at the time operations are proposed. Such reasonable measures may include, but are not limited to, modification of siting or design of facilities, timing of operations, and specification of interim and final reclamation measures, which may require relocating proposed operations up to 200 meters, but not off the leasehold, and prohibiting surface disturbance activities for up to 60 days.

The lands within this lease may include areas not specifically addressed by lease stipulations that may contain special values, may be needed for special purposes, or may require special attention to prevent damage to surface and/or other resources. Possible special areas are identified below. Any surface use or occupancy within such special areas will be strictly controlled or, if absolutely necessary, prohibited. Appropriate modifications to imposed restrictions will be made for the maintenance and operation of producing wells.

1. Slopes in excess of 25 percent.
2. Within 500 feet of surface water and/or riparian areas.
3. Construction with frozen material or during periods when the soil material is saturated or when watershed damage is likely to occur.
4. Within 500 feet of Interstate highways and 200 feet of other existing rights-of-way (i.e., U.S. and State highways, roads, railroads, pipelines, powerlines).
5. Within 0.25 mile of occupied dwellings.
6. Material sites.

GUIDANCE:
The intent of this notice is to inform interested parties (potential lessees, permittees, operators) that when one or more of the above conditions exist, surface-disturbing activities will be prohibited

unless or until the permittee or the designated representative and the surface management agency (SMA) arrive at an acceptable plan for mitigation of anticipated impacts. This negotiation will occur prior to development and become a condition for approval when authorizing the action.

Specific threshold criteria (e.g., 500 feet from water) have been established based upon the best information available. However, geographical areas and time periods of concern must be delineated at the field level (i.e., "surface water and/or riparian areas" may include both intermittent and ephemeral water sources or may be limited to perennial surface water).

The referenced oil and gas leases on these lands are hereby made subject to the stipulation that the exploration or drilling activities will not interfere materially with the use of the area as a materials site/free use permit. At the time operations on the above lands are commenced, notification will be made to the appropriate agency. The name of the appropriate agency may be obtained from the proper BLM Field Office.

THIS NOTICE APPLIES TO ALL PARCELS.

LEASE NOTICE NO. 2

BACKGROUND:
The BLM, by including National Historic Trails within its National Landscape Conservation System, has recognized these trails as national treasures. Our responsibility is to review our strategy for management, protection, and preservation of these trails. The National Historic Trails in Wyoming, which include the Oregon, California, Mormon Pioneer, and Pony Express Trails, as well as the Nez Perce Trail, were designated by Congress through the National Trails System Act (P.L. 90-543; 16 United States Code [U.S.C.] 1241-1251) as amended through P.L. 106-509 dated November 13, 2000. Protection of the National Historic Trails is normally considered under the National Historic Preservation Act (NHPA) (P.L. 89-665; 16 U.S.C. 470 et seq.) as amended through 1992 and the National Trails System Act. Additionally, Executive Order 13195, "Trails for America in the 21st Century," signed January 18, 2001, states in Section 1: "Federal agencies will...protect, connect, promote, and assist trails of all types throughout the United States. This will be accomplished by: (b) Protecting the trail corridors associated with national scenic trails and the high priority potential sites and segments of national historic trails to the degrees necessary to ensure that the values for which each trail was established remain intact." Therefore, the BLM will be considering all impacts and intrusions to the National Historic Trails, their associated historic landscapes, and all associated features, such as trail traces, grave sites, historic encampments, inscriptions, natural features frequently commented on by emigrants in journals, letters and diaries, or any other feature contributing to the historic significance of the trails. Additional National Historic Trails will likely be designated amending the National Trails System Act. When these amendments occur, this notice will apply to those newly designated National Historic Trails as well.

STRATEGY:
The BLM will proceed in this objective by conducting a viewshed analysis on either side of the designated centerline of the National Historic Trails in Wyoming, except, at this time, for the Nez Perce Trail, for the purpose of identifying and evaluating potential impacts to the trails, their associated historic landscapes, and their associated historic features. Subject to the viewshed analysis and archeological inventory, reasonable mitigation measures may be applied. These may include, but are not limited to, modification of siting or design of facilities to camouflage or otherwise hide the proposed operations within the viewshed. Additionally, specification of interim and final reclamation measures may require relocating the proposed operations within

the leasehold. Surface-disturbing activities will be analyzed in accordance with the National Environmental Policy Act (NEPA) of 1969 (P.L. 91190; 42 U.S.C. 4321-4347) as amended through P.L. 94-52, July 3, 1975 and P.L. 94-83, August 9, 1975, and the NHPA, supra, to determine if any design, siting, timing, or reclamation requirements are necessary. This strategy is necessary until the BLM determines that, based on the results of the completed viewshed analysis and archeological inventory, the existing land use plans (RMPs) have to be amended.

The use of this lease notice is a predecisional action, necessary until final decisions regarding surface-disturbing restrictions are made. Final decisions regarding surface-disturbing restrictions will take place with full public disclosure and public involvement over the next several years if BLM determines that it is necessary to amend existing land use plans.

GUIDANCE:
The intent of this notice is to inform interested parties (potential lessees, permittees, operators) that when any oil and gas lease contains remnants of National Historic Trails, or is located within the viewshed of a National Historic Trails' designated centerline, surface-disturbing activities will require the lessee, permittee, operator or, their designated representative, and the SMA to arrive at an acceptable plan for mitigation of anticipated impacts. This negotiation will occur prior to development and become a condition for approval when authorizing the action.

THIS NOTICE APPLIES TO ALL PARCELS.

LEASE NOTICE NO. 3

Greater Sage-Grouse Habitat: The lease may in part, or in total, contain important Greater Sage-Grouse habitats as identified by the BLM, either currently or prospectively. The operator may be required to implement specific measures to reduce impacts of oil and gas operations on the Greater Sage-Grouse populations and habitat quality. Such measures shall be developed during the Application for Permit to Drill (APD) onsite and environmental review process and will be consistent with the lease rights granted.

THIS NOTICE APPLIES TO ALL PARCELS.

UNNUMBERED LEASE NOTICE

ATTACHMENT TO EACH LEASE

Provisions of the Mineral Leasing Act (MLA) of 1920, as amended by the Federal Coal Leasing Amendments Act of 1976, affect an entity's qualifications to obtain an oil and gas lease. Section 2(a)(2)(A) of the MLA, 30 U.S.C. 201 (a)(2)(A), requires that any entity that holds and has held a Federal coal lease for 10 years beginning on or after August 4, 1976, and who is not producing coal in commercial quantities from each such lease, cannot qualify for the issuance of any other lease granted under the MLA. Compliance by coal lessees with Section 2(a)(2)(A) is explained in 43 CFR 3472.

In accordance with the terms of this oil and gas lease, with respect to compliance by the initial lessee with qualifications concerning Federal coal lease holdings, all assignees and transferees are hereby notified that this oil and gas lease is subject to cancellation if: (1) the initial lessee as assignor or as transferor has falsely certified compliance with Section 2(a)(2)(A), or (2) because of a denial or disapproval by a State Office of a pending coal action, i.e., arms-length assignment, relinquishment, or logical mining unit, the initial lessee as assignor or as transferor is no longer in compliance with Section 2(a)(2)(A). The assignee, sublessee or transferee does not qualify as

a bona fide purchaser and, thus, has no rights to bona fide purchaser protection in the event of cancellation of this lease due to noncompliance with Section 2(a)(2)(A).

Information regarding assignor, sublessor or transferor compliance with Section 2(a)(2)(A) is contained in the lease case file as well as in other BLM records available through the State Office issuing this lease.

H.2. Lease Stipulations

The Resource Management Plan (RMP) determines which areas of the planning area are open to fluid mineral leasing, including the constraints or conditions open areas are subject to, and which areas are closed to fluid mineral leasing. The Proposed RMP (Alternative D) proposes to close the following areas to mineral leasing: Wilderness Study Areas, recommended Wild and Scenic Rivers, and certain Special Recreation Management Areas (Burnt Hollow, Dry Creek Petrified Tree, Middle Fork Powder River, Mosier Gulch, and Hole-in-the-Wall).

In areas open to leasing the BLM may impose lease stipulations. A lease stipulation is a condition of lease issuance that provides a level of protection for other resource values or land uses by restricting lease operations during certain times or locations or to avoid unacceptable impacts, to an extent greater than standard lease terms or regulations. These resource values and land uses generally include wildlife, soil, water, recreation, visual, and cultural resources. A stipulation is an enforceable term of the lease contract, supersedes any inconsistent provisions of the standard lease form, and is attached to and made a part of the lease. Lease stipulations further implement the BLM's regulatory authority to protect resources or resource values. Lease stipulations are developed through the land use planning process. "The authorized officer may require stipulations as conditions of lease issuance. Stipulations shall become part of the lease and shall supersede inconsistent provisions of the standard lease form. Any party submitting a bid… shall be deemed to have agreed to stipulations applicable to the specific parcel…" (43 CFR 3101.1-3).

Exceptions, waivers, and modifications provide an effective means of applying "Adaptive Management" techniques to oil and gas leases and associated permitting activities to meet changing circumstances. The criteria for approval of exceptions, waivers, and modifications should be supported by NEPA analysis, either through the land use planning process or site-specific environmental review.

This appendix identifies fluid mineral lease stipulations and addresses the procedure for providing exceptions, modifications, and waivers of lease stipulations. Procedures for changing Conditions of Approval (COAs) placed on surface disturbance and disruptive activity authorizations to protect resource values are the same.

Definitions

The three types of surface stipulations the BLM applies are: (1) no surface occupancy (NSO), (2) timing limitation stipulation (TLS), and (3) controlled surface use (CSU).

- **NSO:** Use or occupancy of the land surface for fluid mineral exploration or development is prohibited in order to protect identified resource values. The minerals under NSO lands may potentially be developed by directionally or horizontally drilling from nearby lands that do not have the NSO limitation.

- **TLS:** Prohibits surface use during a specified time period to protect identified resource values. (Seasonal Restriction).
- **CSU:** Use and occupancy is allowed (unless restricted by another stipulation), but identified resource values require special operational constraints that may modify lease rights.

Surface use rights are described in more detail at 43 CFR 3101.1-2.

An applicant may request an exception, modification, or waiver of a stipulation or restriction included in a lease or applied as a COA.

- **Exception:** A one-time exemption to a lease stipulation or COA determined on a case-by-case basis.
- **Modification:** A change to the provisions of a lease stipulation, either temporarily or for the term of the lease.
- **Waiver:** A permanent exemption to a lease stipulation.

Standard Stipulations

The following three stipulations are applied to all BLM-administered fluid mineral leases within Wyoming.

LEASE STIPULATION NO. 1: CULTURAL RESOURCES
This lease may be found to contain historic properties and/or resources protected under the NHPA, American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, Executive Order 13007, or other statutes and executive orders. The BLM will not approve any ground-disturbing activities that may affect any such properties or resources until it completes its obligations (e.g., State Historic Preservation Officer [SHPO]) and tribal consultation) under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized or mitigated.

LEASE STIPULATION NO. 2: ENDANGERED SPECIES ACT SECTION 7 CONSULTATION
The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. The BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. The BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended, 16 U.S.C. § 1531 et seq., including completion of any required procedure for conference or consultation.

LEASE STIPULATION NO. 3 MULTIPLE MINERAL DEVELOPMENT
Operations will not be approved which, in the opinion of the authorized officer, would unreasonably interfere with the orderly development and/or production from a valid existing mineral lease issued prior to this one for the same lands.

Buffalo Planning Area Stipulations

The following table lists the fluid mineral lease stipulations and exception, modification, and waiver criteria for those stipulations included under the BLM's Proposed RMP (Alternative D). Table H.1, "Lease Stipulations and Exception, Modification, and Waiver Criteria" (p. 1965) describes the stipulation (NSO, TLS, and CSU), identifies the applicable management action to which the stipulation applies, discloses the approximate acreage to which the stipulation applies, and the criteria for considering exceptions, modifications, and waivers.

Table H.1. Lease Stipulations and Exception, Modification, and Waiver Criteria

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
Soil-1004	CSU	Soil: severe erosion hazard	669,739	Surface disturbance is restricted on soils with a severe erosion hazard rating. Controlled Surface Use (CSU) (1): (a) Prior to surface disturbance on soils with a severe erosion hazard rating a site-specific construction, stabilization, and reclamation plan (Plan) must be submitted to the Bureau of Land Management (BLM) by the applicant as a component of the Application for Permit to Drill (APD) (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: ● The disturbed area will be stabilized with no evidence of accelerated erosion features. ● The disturbed area shall be managed to ensure soil characteristics approximate an appropriate reference site with regard to erosional features to maintain soil productivity and sustainability. ● Sufficient viable topsoil is maintained for ensuring successful final reclamation. At locations where interim reclamation will be completed, this will be accomplished by respreading all salvaged topsoil over the areas of interim reclamation. ● The original landform and site productivity will be partially restored during interim reclamation and fully restored as a result of final reclamation. On the lands described below: CSU (2) as mapped by the Natural Resources Conservation Service (NRCS) Soil Survey Geographic Database (SSURGO) Order 3 soil survey and/or as determined by a BLM evaluation of the area. For the purpose of: CSU (3) ensuring successful reclamation and erosion control on soils with a severe erosion hazard rating in order to meet the standards outlined in, Chapter 6 the BLM's Oil and Gas Gold Book, as revised, and the 2015 Buffalo Field Office (BFO) Resource Management Plan (RMP) Record of Decision (ROD). **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not result in a failure to meet the performance standards above or a BLM evaluation determines that the affected soils do not meet the severe erosion hazard rating criteria. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a NRCS soil survey or BLM evaluation. The stipulation and performance standards identified above may be modified based on monitoring results.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				Waiver: The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not include soils with severe erosion hazard. This determination shall be based upon NRCS mapping and/or BLM evaluation of the area.
Soil-1006	CSU	Soil: slopes greater than 25% and less than 50%	170,590 acres	Surface disturbance is restricted on slopes greater than 25% and less than 50%. CSU (1): (a) Prior to surface disturbance on slopes greater than 25% and less than 50% a site-specific construction, stabilization, and reclamation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The Plan must include designs approved and stamped by a licensed engineer. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: ● Slope stability is maintained preventing slope failure or mass wasting. ● The disturbed area will be stabilized with no evidence of accelerated erosion features. ● The disturbed area shall be managed to ensure soil characteristics approximate an appropriate reference site with regard to erosional features to maintain soil productivity and sustainability. ● Sufficient viable topsoil is maintained for ensuring successful final reclamation. At locations where interim reclamation will be completed, this will be accomplished by respreading all salvaged topsoil over the areas of interim reclamation. ● The original landform and site productivity will be partially restored during interim reclamation and fully restored as a result of final reclamation. On the lands described below: CSU (2) as mapped by the U.S. Geological Survey (USGS) 1:24,000 scale topographic maps, USGS Digital Elevation Models, and/or as determined by a BLM evaluation of the area. For the purpose of: CSU (3) ensuring successful reclamation and erosion control on slopes greater than 25% and less than 50% in order to meet the standards outlined in Chapter 6 of the BLM's Oil and Gas Gold Book, as revised, and the 2015 BFO RMP ROD. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not result in a failure to meet the performance standards above, or a BLM evaluation determines that the disturbed area is not located on slopes greater than 25% but less than 50%. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation of the area. The stipulation and performance standards identified above may be modified based on monitoring results.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				Waiver: The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not include slopes greater than 25% but less than 50%. This determination shall be based upon USGS mapping and/or BLM evaluation of the area.
Soil-1006	NSO	Soil: slopes greater than 50%	45,570	No surface occupancy (NSO) or use is allowed on slopes greater than 50%. On the lands described below: NSO (1) as mapped by the USGS 1:24,000 scale topographic maps, USGS Digital Elevation Models, and/or as determined by a BLM evaluation of the area. For the purpose of: NSO (2) preventing mass slope failure and accelerated erosion. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not result in a mass slope failure or accelerated erosion, or if the action is located entirely within an existing surface disturbance. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation of the area. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not include slopes greater than 50%. This determination shall be based upon USGS mapping and/or BLM evaluation of the area.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
Soil-1010	CSU	Soil: limited reclamation potential areas	685,950 acres	Surface disturbance is prohibited or restricted on limited reclamation potential areas such as areas possessing sensitive geologic formations, extremely limiting soil conditions, biological soil crusts, badlands, rock outcrops, and slopes susceptible to mass failure. CSU (1): (a) CSU (1): (a) Prior to surface disturbance on limited reclamation potential areas a site-specific construction, stabilization, and reclamation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The Plan must include designs approved and stamped by a licensed engineer. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: ● The disturbed area will be stabilized with no evidence of accelerated erosion features. ● The disturbed area shall be managed to ensure soil characteristics approximate an appropriate reference site with regard to erosional features to maintain soil productivity and sustainability. ● Slope stability is maintained preventing slope failure and erosion. ● Sufficient viable topsoil is maintained for ensuring successful final reclamation. At locations where interim reclamation will be completed, this will be accomplished by respreading all salvaged topsoil over the areas of interim reclamation. ● The original landform and site productivity will be partially restored during interim reclamation and fully restored as a result of final reclamation. On the lands described below: CSU (2) as mapped by the NRCS SSURGO Order 3 soil survey and as determined by a BLM evaluation of the area. For the purpose of: CSU (3) ensuring successful reclamation and erosion control on limited reclamation potential areas in order to meet the standards outlined in, Chapter 6 of the BLM's Oil and Gas Gold Book, as revised, and the 2015 BFO RMP ROD. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not result in a failure to meet the performance standards above or a BLM evaluation determines that the area does not meet the limited reclamation criteria. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a NRCS soil survey and BLM evaluation. The stipulation and performance standards identified above may be modified based on monitoring results.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				Waiver: The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not include limited reclamation potential areas. This determination shall be based upon NRCS mapping and BLM evaluation.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
Water-1014	CSU	Water: surface waters	95,172 acres	Surface disturbance is restricted within 500 feet of springs, non-Coalbed Natural Gas (CBNG) reservoirs, water wells, and perennial streams. CSU (1): (a) CSU (1): (a) Prior to surface disturbance within 500 feet of springs, non-CBNG reservoirs, water wells, and perennial streams a site-specific construction, stabilization, and reclamation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: ● storm water and surface runoff will be controlled to minimize erosion (rilling, gullying, piping, mass wasting) and offsite siltation during construction, use/operations, and reclamation. ● offsite areas will be protected from accelerated soil erosion. ● the original landform and site productivity will be partially restored during interim reclamation and fully restored as a result of final reclamation. CSU (2) as mapped by the USGS National Hydrologic Inventory and/or as determined by a BLM evaluation of the area. For the purpose of: CSU (3) ensuring protection of surface waters and associated riparian habitats by meeting the standards outlined in, Chapter 6 of the BLM's Oil and Gas Gold Book, as revised, and the 2015 BFO RMP ROD. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not result in a failure to meet the performance standards above. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a USGS National Hydrologic Inventory and/or BLM evaluation, in coordination with the Wyoming DEQ and/or Wyoming State Engineer's Office (WSEO). The stipulation and performance standards identified above may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within 500 feet of springs, non-CBNG reservoirs, water wells, and perennial streams. This determination shall be based upon USGS National Hydrologic Inventory and/or BLM evaluation, in coordination with the Wyoming DEQ and/or BFO.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
Cave-1004	CSU	Cave and Karst: significant caves	212,626 acres	Surface disturbance is restricted near the entrances to significant caves. CSU (1): (a) Prior to surface disturbance or disruptive activities near an entrance to a significant cave a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the BLM authorized officer's satisfaction that the action will not destroy, disturb, deface, mar, alter, remove, or harm any significant cave or alter the free movement of any animal or plant life into or out of any significant cave. On the lands described below: CSU (2) as mapped by the BLM. For the purpose of: CSU (3) protecting significant cave resources (any material or substance occurring naturally in caves, such as animal life, plant life, paleontological deposits, sediments, minerals, speleogens, and speleothems). **Exception:** The BLM authorized officer may grant an exception if it is determined that the significant cave resource(s) will be protected. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon on local evaluation. The stipulation and standards identified above may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative of the operator subject to confirmation from BLM. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not contain significant caves. This determination shall be based upon USGS or BLM data and field evaluation of the area.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
Coal-2002 O&G-2007	CSU	Coal: areas identified as highly likely to be considered in a Coal (LBA)	304,967 acres	Surface use or occupancy is restricted within areas identified as highly likely to be considered in a Coal Lease by Application (LBA). CSU (1): Surface use or occupancy shall not be allowed by oil and gas lessee(s), operating rights holder(s), and/or oil and gas operator(s) on this federal oil and gas lease to conduct any oil and gas operation, including drilling for, removing, or disposing of oil and/or gas contained in federal coal lease(s) unless a plan for mitigation of anticipated impacts is developed between the oil and gas and the coal lessees, and the Plan is approved by the BLM authorized officer; On the lands described below: CSU (2) areas identified as highly likely to be considered in a Coal LBA as mapped by the U.S. Office of Surface Mining, Wyoming Department of Environmental Quality (DEQ), USGS, and/or BLM. For the purpose of: CSU (3) protecting the first in time valid existing rights of the coal lessee, the BLM authorized officer reserves the right to alter or modify any oil and gas operations on the lands described in this lease ensuring: a.) the orderly development of the coal resource by surface and/or underground mining methods; b.) coal mine worker safety; and/or c.) coal production rates or recovery of the coal resource. The oil and gas lessee(s), operating rights holder(s), and/or oil and gas operator(s) of this federal oil and gas lease shall not hold the United States as lessor, coal lessee(s), sub-lessee(s), and/or coal operator(s) liable for any damage or loss of the oil and gas resource, including the venting of CBNG, caused by coal exploration or mining operations conducted on federal coal lease. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not interfere with coal operations. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not contain areas identified as highly likely to be considered in a coal LBA. This determination shall be based upon U.S. Office of Surface Mining, Wyoming DEQ, USGS, and/or BLM data.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
Riparian-4009	CSU	Riparian and Wetlands	144,045 acres	Surface disturbance is restricted within 500 feet of riparian systems, wetlands, and aquatic habitats. CSU (1): (a) Prior to surface disturbance within 500 feet of riparian systems, wetlands, and aquatic habitats a site-specific construction, stabilization, and reclamation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: ● storm water and surface runoff will be controlled to minimize erosion (rilling, gullying, piping, mass wasting) and offsite siltation during construction, use/operations, and reclamation. ● offsite areas will be protected from accelerated soil erosion. ● the original landform and site productivity will be partially restored during interim reclamation and fully restored as a result of final reclamation. CSU (2) as mapped by the USGS National Hydrologic Inventory and/or as determined by a BLM evaluation of the area. For the purpose of: CSU (3) ensuring protection of surface waters and associated riparian habitats by meeting the standards outlined in, Chapter 6 of the BLM's Oil and Gas Gold Book, as revised, and the 2015 BFO RMP ROD. CSU (3) On the lands described below: **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not result in a failure to meet the performance standards above. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a USGS National Hydrologic Inventory and/or BLM evaluation. The stipulation and performance standards identified above may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within 500 feet of riparian systems, wetlands, and aquatic habitats. This determination shall be based upon USGS National Hydrologic Inventory and/or BLM field evaluation.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
Fish-4013	CSU	Fish: occupied habitat	261,870 acres	Surface disturbance is restricted within 0.25 mile of naturally occurring water bodies containing native or desirable non-native fish species. CSU (1): (a) Prior to surface disturbance within 0.25 mile of naturally occurring water bodies containing native or desirable non-native fish species a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that there will not be a local decline in fish abundance or range as a result of the lease operations. Examples of a few of the items to consider are as follows: • Spill prevention measures to ensure hydrocarbons and other potentially toxic substances used for lease activities are prevented from entering the watercourse. • Sediment control measures to ensure increased sediment contributions are avoided. On the lands described below: CSU (2) as mapped by the Wyoming Game and Fish Department (WGFD) and/or BLM. For the purpose of: CSU (3) protecting native and desirable non-native fish populations and habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not result in a local decline in native or desirable non-native fish abundance or range. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a WGFD or BLM evaluation, in coordination with the WGFD. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within 0.25 mile of naturally occurring water bodies containing native and desirable non-native fish species. This determination shall be based upon WGFD mapping and BLM onsite evaluation of the area.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
WL-4015	NSO	Wildlife: Big game habitat management areas	14,216 acres	NSO or use is allowed within WGFD Big Game Habitat Management Areas (Ed O. Taylor, Kerns, Bud Love, and Amsden Creek). On the lands described below: NSO (1) as mapped by the WGFD. For the purpose of: NSO (2) ensuring the function and suitability of WGFD Big Game Habitat Management Areas. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not impair the function or suitability of WGFD Big Game Habitat Management Areas. **Modification:** The BLM-authorized officer may modify the area subject to the stipulation based upon a WGFD and BLM evaluation, in coordination with the WGFD. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within a WGFD big game habitat management area. This determination shall be based upon a BLM evaluation, in coordination with the WGFD.
WL-4017	TLS	Wildlife: big game crucial winter range	81,437 acres	Surface-disturbing and disruptive activities are prohibited or restricted from (1) November 15 to April 30 within big-game crucial winter range, or from May 1 to June 15 within elk calving areas (WGFD 2009a). On the lands described below: TLS (2) as mapped by the WGFD and evaluated by the BLM. For the purpose of: TLS (3) ensuring the function and suitability of crucial big game winter ranges. **Exception:** The BLM authorized officer may grant an exception if the operator demonstrates that the crucial habitat is not occupied during the period of concern, subject to confirmation by the WGFD and BLM; or it is determined that the action will not impair the function or suitability of the crucial habitat. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation, in coordination with the WGFD, to determine that the big game crucial winter range is not present or boundaries of the subject winter range areas have been refined. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within big game crucial winter range or an elk calving area. This determination shall be based upon a BLM evaluation of the area, in coordination with the WGFD.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
WL-4017	TLS	Wildlife: elk calving areas	37,549 acres	Surface-disturbing and disruptive activities are prohibited or restricted from (1) May 1 to June 15 within elk calving areas (WGFD 2009a). On the lands described below: TLS (2) as mapped by the WGFD and evaluated by the BLM. For the purpose of: TLS (3) ensuring the function and suitability of elk calving areas. **Exception:** The BLM authorized officer may grant an exception if the operator demonstrates that the crucial elk calving habitat is not occupied during the period of concern, subject to confirmation by the WGFD and BLM; or it is determined that the action will not impair the function or suitability of the crucial habitat. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation, in coordination with the WGFD, to determine that the elk calving habitat is not present or boundaries of the subject calving areas have been refined. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within an elk calving area. This determination shall be based upon a BLM evaluation of the area, in coordination with the WGFD.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
WL-4017	CSU	Wildlife: big game crucial winter ranges	81,437 acres	Surface disturbance is prohibited or restricted within WGFD designated big game crucial winter range. CSU (1): (a) Prior to surface disturbance within WGFD designated big game crucial winter range, a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that the function and suitability of crucial big game winter ranges will not be impaired On the lands described below: CSU (2) as mapped by the WGFD. For the purpose of: CSU (3) ensuring the function and suitability of crucial big game winter range. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not impair the function or suitability of the crucial habitat. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation, in coordination with the WGFD. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within big game crucial winter range. This determination shall be based upon a BLM evaluation of the area, in coordination with the WGFD.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
WL-4017	CSU	Wildlife: elk calving areas	37,549 acres	Surface disturbance is prohibited or restricted within WGFD designated elk calving areas. CSU (1): (a) Prior to surface disturbance within WGFD designated elk calving areas a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that the function and suitability of elk calving area will not be impaired. On the lands described below: CSU (2) as mapped by the WGFD. For the purpose of: CSU (3) ensuring the function and suitability of elk calving areas. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not impair the function or suitability of the elk calving area. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation, in coordination with the WGFD. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within an elk calving area. This determination shall be based upon a BLM evaluation of the area, in coordination with the WGFD.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
WL-4018 WL-4021	CSU	Wildlife: crucial elk ranges	173,512 acres	Surface disturbance is prohibited or restricted within WGFD designated elk crucial winter range and calving areas. CSU (1): (a) Fluid mineral production and byproducts shall be piped out of and (b) permanent above ground facilities will be located outside of WGFD designated elk crucial winter range and calving areas unless a mitigation plan (Plan) submitted by the applicant and approved by the BLM as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (c) The Plan must demonstrate to the authorized officer's satisfaction that the function and suitability of elk crucial winter range and elk calving areas will not be impaired. On the lands described below: CSU (2) as mapped by the WGFD. For the purpose of: CSU (3) ensuring the function and suitability of elk crucial winter range and elk calving areas. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not impair the function or suitability of the crucial habitat. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation, in coordination with the WGFD. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within elk crucial winter range or a calving area. This determination shall be based upon a BLM evaluation, in coordination with the WGFD.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
WL-4023	CSU	Wildlife: Fortification Creek Planning Area	79,362 acres	Surface occupancy or use is subject to the following special operating constraints. CSU (1) Surface-disturbing and disruptive activities shall only be approved with adequate mitigation to ensure compliance with the Fortification Creek RMP Amendment (BLM 2011c) performance standards. Prior to surface disturbance within the Fortification Creek Planning Area a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). On the lands described below: CSU (2) within the Fortification Creek Planning Area (Map 76) For the purpose of: CSU (3) protecting the viability of the Fortification elk herd and facilitating ecosystem reconstruction in the stabilization of disturbed areas. **Exception:** The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, is sited in a location, or otherwise designed, such that the Fortification Creek Resource Management Planning Area objectives (performance standards) are not applicable (i.e., outside the elk yearlong range). **Modification:** The authorized officer may modify the area subject to the stipulation or the CSU criteria if an environmental record of review finds that a portion of the CSU area is nonessential, it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site, or the modification will meet the goals identified in the Fortification Creek Resource Management Planning Area. **Waiver:** This stipulation may be waived over the entire lease if the authorized officer determines that the described lands are not within the Fortification elk herd yearlong range or do not contain areas of limited reclamation potential (including slopes greater than 25%) and therefore the Fortification Creek Resource Management Planning Area objectives (performance standards) are not applicable. This determination shall be based upon BLM evaluation of the area. The determination may be coordinated with other agencies such as the WGFD or NRCS.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
WL-4026	CSU	Wildlife: sharp-tailed grouse leks	3,601 acres	Surface disturbance is prohibited or restricted within 0.25 mile of the perimeter of occupied sharp-tailed grouse leks. CSU (1): (a) Prior to surface disturbance within 0.25 mile of the perimeter of occupied sharp-tailed grouse leks a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that the function and suitability of sharp-tailed grouse breeding habitat will not be impaired (result in physical injury; a decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or lek abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior). On the lands described below: CSU (2) as mapped by the WGFD. For the purpose of: CSU (3) ensuring the function and suitability of sharp-tailed grouse breeding habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not impair the function and suitability of sharp-tailed grouse breeding habitat. The determination may include consultation with the WGFD. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation, in coordination with the WGFD. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within 0.25 mile of an occupied sharp-tailed grouse lek. This determination shall be based upon a BLM evaluation, in coordination with the WGFD.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
WL-4026	TLS	Wildlife: sharp-tailed grouse nesting	191,257 acres	Surface-disturbing and disruptive activities are prohibited or restricted from April 1 to July 15 (WGFD 2009a) within 2 miles of the perimeter of occupied sharp-tailed grouse leks. On the lands described below: TLS (2) as mapped by the WGFD and evaluated by the BLM. For the purpose of: TLS (3) ensuring the function and suitability of sharp-tailed grouse nesting habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable sharp-tailed grouse habitat may be exempted from this timing limitation. The determination may include coordination with the WGFD, so that granting an exception would not adversely impact the population being protected. **Modification:** The BLM authorized officer may modify the size and shape of the TLS area or the TLS criteria if it is determined that the actual habitat suitability for seasonal sharp-tailed grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the sharp-tailed grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined, in coordination with the WGFD, that the described lands are incapable of serving the long-term requirements of sharp-tailed grouse breeding, nesting, and early brood-rearing habitat.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
WL-4028	CSU	Wildlife: non-special status species raptor nests	1,195,815 acres	Surface disturbance is restricted within U.S. Fish and Wildlife Service (USFWS) Wyoming Ecological Service's recommended spatial biological buffers (Appendix K (p. 2161)) or http://www.fws.gov/wyominges/Pages/Species/Species_SpeciesConcern/Raptors.html) of active non-special status species raptor nests. CSU (1) (a) Prior to surface disturbance within USFWS recommended spatial buffers of raptor nests a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that nesting raptors will not be disturbed. Nesting raptors will not be agitated or bothered to a degree that causes or is likely to cause: ● physical injury, ● a decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or ● nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. On the lands described below: CSU (2) as mapped on the BFO Geographic Information System (GIS) database or determined by the BLM from field evaluation, in coordination with the WGFD and/or USFWS. For the purpose of: CSU (3) ensuring raptor productivity. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not result in a failure to meet the performance standards above. The determination may include coordination with the WGFD or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. Spatial buffers may be modified based on auditory and visual impacts, as well as the topography and other ecological characteristics surrounding the nest site. The stipulation and performance standards identified above may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include consultation with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not include spatial buffer zones for nesting raptors. This determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include consultation with the WGFD or USFWS.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
WL-4030	TLS	Wildlife: non-special status species raptor nesting		Surface-disturbing and disruptive activities are prohibited or restricted within (1) the USFWS Wyoming Ecological Service's recommended spatial buffers and dates of active non-special status species raptor nests. (Appendix K (p. 2161) or http://www.fws.gov/wyominges/Pages/Species/Species_SpeciesConcern/Raptors.html). On the lands described below: TLS (2) as mapped on the BFO GIS database or determined by, BLM from field evaluation, in coordination with the WGFD and/or USFWS. For the purpose of: TLS (3) ensuring raptor nest productivity. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not disturb (likely to cause physical injury; a decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior) nesting raptors. The determination may include consultation with the WGFD or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. Spatial buffers may be modified based on auditory and visual impacts, as well as the topography and other ecological characteristics surrounding the nest site. The stipulation may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. The confirmation may include consultation with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not include spatial buffers for raptor nests. This determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS Plant-4008	NSO	SS Plants: populations		NSO or use is allowed within special status species plant populations. On the lands described below: NSO (1) as mapped on the BFO GIS database, or determined by BLM from field evaluation, in coordination with the Wyoming Natural Disturbance Density and/or USFWS. For the purpose of: NSO (2) protecting special status species plant populations. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not adversely affect special status species plant populations. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation, in coordination with the USFWS. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not contain a special status species plant population. This determination shall be based upon a BLM evaluation, in coordination with the USFWS.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS Plant-4008	CSU	SS Plants: habitat	243,929 acres	Surface disturbance is prohibited or restricted within special status plant species habitat. CSU (1) (a) Prior to surface disturbance within special status plant species habitat flowering season survey(s) must be conducted and a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that special status plant species will not be harmed and that the habitat on which they depend will be conserved. On the lands described below: CSU (2) as mapped or determined by the USFWS, Wyoming Natural Diversity Database, the BFO GIS database, or from field evaluation. For the purpose of: CSU (3) conserving special status plant species and the habitat on which they depend. **Exception:** The BLM authorized officer may grant an exception if flowering season survey(s) determine that a special status species plant population is not present or it is determined that the action is sited in a location so that the action will not harm special status plant species. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation and performance standards identified above may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. **Waiver:** The BLM authorized officer may waive this stipulation if flowering season survey(s) determine that the entire lease area does not include populations or habitat of special status species plants. This determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS Plant-4008	CSU	SS Plants: Ute ladies'-tresses orchid populations	0 acres	Surface disturbance is prohibited or restricted within 0.25 mile of Ute ladies'-tresses orchid populations. CSU (1) (a) Prior to surface disturbance within Ute ladies'-tresses orchid habitat flowering season survey(s) must be conducted and a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that Ute ladies'-tresses orchids will not be harmed and that the habitat on which they depend will be conserved. On the lands described below: CSU (2) as mapped or determined by the USFWS, Wyoming Natural Diversity Database, the BFO GIS database, or from field evaluation. For the purpose of: CSU (3) conserving Ute ladies'-tresses orchids and the habitat on which they depend. **Exception:** The BLM authorized officer may grant an exception if flowering season survey(s) determine that a Ute ladies'-tresses orchid population is not present or it is determined that the action is sited in a location so that the action will not harm special status plant species. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation and performance standards identified above may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. **Waiver:** The BLM authorized officer may waive this stipulation if flowering season survey(s) determine that the entire lease area does not include populations or habitat of Ute ladies'-tresses orchid. This determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS Fish -4008	NSO	SS Fish: occupied habitat	4,846 acres	NSO or use is allowed within 0.25 mile of any waters containing special status fish species. On the lands described below; NSO (1) as mapped on the BFO GIS database or from field evaluation, in consultation with the WGFD. For the purpose of: NSO (2) protecting special status fish populations and habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not result in a local decline in special status species fish abundance or range. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation, in consultation with the WGFD. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within 0.25 mile of any waters containing special status fish species. This determination shall be based upon WGFD mapping and field evaluation of the area.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4007	CSU	SS Wildlife: special status wildlife habitat	2,325,854	Surface disturbance is restricted within special status species wildlife habitat. CSU (1) (a) Prior to surface disturbance within special status species wildlife habitat an occupancy survey must be conducted and a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that special status wildlife species will not be harmed (any act which actually kills or injures wildlife including habitat modification or degradation that substantially impairs essential behavioral patterns) and that the habitat on which they depend will be conserved. On the lands described below: CSU (2) as mapped or determined by the USFWS, WGFD, Wyoming Natural Diversity Database, or BLM from field evaluation. For the purpose of: CSU (3) conserving special status species wildlife and the habitat on which they depend (BLM 2008d - 6840 manual). **Exception:** The BLM authorized officer may grant an exception if an occupancy survey determines that special status wildlife species are not present or it is determined that the action is sited in a location so that the action will not harm special status wildlife species. Confirmation may include coordination with the WGFD and/or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation and performance standards identified above may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD and/or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not include special status species wildlife habitat. This determination shall be based upon field studies of the area by a qualified representative subject to confirmation from BLM. Confirmation may include coordination with the WGFD and/or USFWS.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4009	CSU	SS Wildlife: prairie dog colonies and dependent species	58,902 acres	Surface disturbance is prohibited or restricted within active prairie dog colonies on BLM-administered surface. CSU (1) (a) Prior to surface disturbance within active prairie dog colonies on BLM-administered surface a special status species occupancy survey must be conducted and a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that activities with active prairie dog colonies on BLM surface would not adversely impact suitable habitat for special status species dependent upon prairie dog colonies. On the lands described below: CSU (2) as mapped or determined on the BFO GIS database or from field evaluation, in coordination with the USFWS and WGFD. For the purpose of: CSU (3) conserving special status species wildlife and the prairie dog colonies on which they depend. **Exception:** The BLM authorized officer may grant an exception if it is determined that special status wildlife species are not present or it is determined that the action is sited in a location so that the action will not harm special status wildlife species. This determination shall be based upon evaluation by a qualified representative, subject to confirmation from BLM. Confirmation may include coordination with the WGFD and/or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation and performance standards identified above may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD and/or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not occupied by prairie dog dependent special status wildlife species. This determination shall be based upon field studies of the area by a qualified representative subject to confirmation from BLM. Confirmation may include coordination with the WGFD and/or USFWS.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4024	NSO	SS Wildlife: Greater Sage-Grouse Core Population Areas and Connectivity Corridors	Core Population Areas: 30,754 acres Connectivity Corridors: 7,359 acres	**Stipulation**: Occupied Greater Sage-Grouse leks inside designated Core Population Areas and Connectivity Corridors. This area encompasses occupied Greater Sage-Grouse leks inside designated Core Population Areas and Connectivity Corridors. NSO or use is allowed within a six-tenths (0.6) mile radius of the perimeter of occupied Greater Sage-Grouse leks inside designated Core Population Areas and Connectivity Corridors, as mapped on the BFO GIS database. **Purpose**: To protect occupied Greater Sage-Grouse leks and associated seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse in proximity to leks, from habitat fragmentation and loss and Greater Sage-Grouse populations from disturbance inside designated Core Population Areas and Connectivity Corridors. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the area subject to the stipulation or the NSO criteria if an environmental record of review finds that a portion of the NSO area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver**: This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the site is no longer considered in the land use plan to be within a Greater Sage-Grouse designated Core Population Area or Connectivity Corridor or Greater Sage-Grouse are no longer a BLM sensitive or special status species and are not listed by the USFWS as Threatened or Endangered under the Endangered Species Act (ESA). Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4024	CSU	SS Wildlife: Greater Sage-Grouse Core Population Areas and Connectivity Corridors	Core Population Areas: 30,754 acres Connectivity Corridors: 7,359 acres	**Stipulation**: Greater Sage-Grouse Core Population Areas and Connectivity Corridors (Priority Habitat). This area encompasses BLM-administered surface within Greater Sage-Grouse Core Population Areas and Connectivity Corridors (Priority Habitat). All applicable surface disturbances (existing or future, and not limited to fluid mineral disturbances) must be restored, as described in the BFO RMP, to the approval of the BLM authorized officer. **Purpose**: To restore functional Greater Sage-Grouse habitat to support core Greater Sage-Grouse populations. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent needs of Greater Sage-Grouse. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the area subject to the stipulation or surface occupancy criteria if an environmental record of review finds that a portion of the CSU area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the needs of the Greater Sage-Grouse. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver**: This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the site is no longer considered in the land use plan to be within a Greater Sage-Grouse Core Population Area or Connectivity Corridor or Greater Sage-Grouse are no longer a BLM sensitive or special status species and are not listed by the USFWS as Threatened or Endangered under the ESA. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4024	TLS	SS Wildlife: Greater Sage-Grouse Core Population Areas and Connectivity Corridors	Core Population Areas: 30,754 acres Connectivity Corridors: 7,359 acres	**Stipulation**: Occupied Greater Sage-Grouse leks in designated Core Population Areas or Connectivity Corridors. This area encompasses occupied Greater Sage-Grouse leks in designated Core Population Areas or Connectivity Corridors. No disruptive activity is allowed during 6:00 p.m. – 8:00 a.m., March 1 – May 15, within a six tenths (0.6) mile radius of the perimeter of occupied Greater Sage-Grouse leks in designated Core Population Areas or Connectivity Corridors. **Purpose**: To seasonally protect occupied Greater Sage-Grouse leks from disruptive activity in designated Core Population Areas or Connectivity Corridors. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver**: This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the described lands are no longer considered in the land use plan to be within a Greater Sage-Grouse designated Core Population Area or Connectivity Corridor or are incapable of serving the long-term requirements of Greater Sage-Grouse breeding habitat and that these ranges no longer warrant consideration as components of Grater Sage-Grouse breeding habitat. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4024	TLS	SS Wildlife: Greater Sage-Grouse Core Population Areas and Connectivity Corridors	Core Population Areas: 30,754 acres Connectivity Corridors: 7,359 acres	**Stipulation**: Occupied Greater Sage-Grouse leks in designated Core Population Areas or Connectivity Corridors. This area encompasses occupied Greater Sage-Grouse leks in designated Core Population Areas or Connectivity Corridors. Noise levels may not exceed 10 A–weighted decibels above ambient noise during 6:00 p.m. – 8:00 a.m., March 1 – May 15, within a six tenths (0.6) mile radius of the perimeter of occupied Greater Sage-Grouse leks in designated Core Population Areas or Connectivity Corridors. **Purpose**: To seasonally protect occupied Greater Sage-Grouse leks from disruptive activity in designated Core Population Areas or Connectivity Corridors. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver**: This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the described lands are no longer considered in the land use plan to be within a Greater Sage-Grouse designated Core Population Area or Connectivity Corridor or are incapable of serving the long-term requirements of Greater Sage-Grouse breeding habitat and that these ranges no longer warrant consideration as components of Greater Sage-Grouse breeding habitat. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4024	TLS	SS Wildlife: Greater Sage-Grouse winter concentration areas that support nesting in Core Population Areas (Priority Habitat Area and general habitat)	Not mapped	**Stipulation**: Greater Sage-Grouse winter concentration areas. This area encompasses Greater Sage-Grouse winter concentration areas. No surface use is allowed during December 1 – March 14, within Greater Sage-grouse Winter concentration areas in designated core population areas, and outside designated core population areas when supporting wintering Greater Sage-Grouse that attend leks within designated core population areas. Purpose: To seasonally protect Greater Sage-Grouse winter concentration areas from disruptive activities. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not impair the function and suitability of the winter concentration area, or it is determined that the winter concentration area is not occupied by concentrated populations of Greater Sage-Grouse during the period of concern. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver**: This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the described lands are incapable of serving the long-term requirements of Greater Sage-Grouse winter habitat and that these ranges no longer warrant consideration as components of Greater Sage-Grouse winter habitat. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4024	CSU	SS Wildlife: Greater Sage-Grouse Core Population Areas	519,444 acres	**Stipulation**: Greater Sage-Grouse designated Core Population Areas. This area encompasses Greater Sage-Grouse designated Core Population Areas. Surface occupancy or use will be restricted to no more than an average of one disturbance location per 640 acres using the Density and Disturbance Calculation Tool (DDCT), and the cumulative value of all applicable surface disturbances, existing or future, must not exceed 5 percent of the DDCT area. This lease does not guarantee the lessee the right to occupy the surface of the lease for the purpose of producing oil and natural gas within Greater Sage-Grouse designated Core Population Areas. The surface occupancy restriction criteria identified in this stipulation may preclude surface occupancy and may be beyond the ability of the lessee to meet due to existing surface disturbance on Federal, State, or private lands within designated Core Population Areas or surface disturbance created by other land users. The BLM may require the lessee or operator to enter into a unit agreement or drilling easement to facilitate the equitable development of this and surrounding leases. **Purpose**: To protect Greater Sage-Grouse designated Core Population Areas from habitat fragmentation and loss. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse. An exception to the stated limits may be granted when offsite mitigation is determined to provide an overall beneficial effect to Greater Sage-Grouse habitat and populations. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the area subject to the stipulation or surface occupancy criteria if an environmental record of review finds that a portion of the CSU area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				Waiver: This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the site is no longer considered in the land use plan to be within a Greater Sage-Grouse designated Core Population Area or Greater Sage-Grouse are no longer a BLM sensitive or special status species and are not listed by the USFWS as Threatened or Endangered under the ESA. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4024	TLS	SS Wildlife: Greater Sage-Grouse Core Population Area nesting habitat	440,114 acres	**Stipulation**: Greater Sage-Grouse breeding, nesting, and early brood-rearing habitats inside designated Core Population Areas. This area encompasses Greater Sage-Grouse breeding, nesting, and early brood-rearing habitats inside designated Core Population Areas. No surface use is allowed during March 15 – June 30, inside designated Core Population Areas. **Purpose**: To seasonally protect Greater Sage-Grouse breeding, nesting, and early brood-rearing habitats from disruptive activities inside designated Core Population Areas. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver**: This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the described lands are no longer considered in the land use plan to be within a Greater Sage-Grouse designated Core Population Area or are incapable of serving the long-term requirements of Greater Sage-Grouse breeding, nesting, or early brood-rearing habitat and that these ranges no longer warrant consideration as components of Greater Sage-Grouse breeding, nesting, or early brood-rearing habitat. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4024	CSU	SS Wildlife: Greater Sage-Grouse Connectivity Corridors	150,006 acres	**Stipulation**: Greater Sage-Grouse Connectivity Corridors. This area encompasses Greater Sage-Grouse Connectivity Corridors. The cumulative value of all applicable surface disturbances must not exceed an average of 5 percent of the sagebrush habitat mapped on the BFO GIS database per 640 acres, using the DDCT. This lease does not guarantee the lessee the right to occupy the surface of the lease for the purpose of producing oil and natural gas within Greater Sage-Grouse designated Connectivity Corridors. The surface occupancy restriction criteria identified in this stipulation may preclude surface occupancy and may be beyond the ability of the lessee to meet due to existing surface disturbance on Federal, State, or private lands within designated Connectivity Corridors or surface disturbance created by other land users. The BLM may require the lessee or operator to enter into a unit agreement or drilling easement to facilitate the equitable development of this and surrounding leases. **Purpose**: To protect Greater Sage-Grouse Connectivity Corridors from habitat fragmentation and loss. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse. An exception to the stated limits may be granted when offsite mitigation is determined to provide an overall beneficial effect to Greater Sage-Grouse habitat and populations. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the area subject to the stipulation or surface occupancy criteria if an environmental record of review finds that a portion of the CSU area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				Waiver: This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the site is no longer considered in the land use plan to be a Greater Sage-Grouse Connectivity Corridor or Greater Sage-Grouse are no longer a BLM sensitive or special status species and are not listed by the USFWS as Threatened or Endangered under the ESA. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
SS WL-4024	TLS	SS Wildlife: Greater Sage-Grouse Connectivity Corridor nesting habitat	131,849 acres	**Stipulation**: Greater Sage-Grouse breeding, nesting, and early brood-rearing habitat within Connectivity Corridors. This area encompasses Greater Sage-Grouse breeding, nesting, and early brood-rearing habitat within Connectivity Corridors. No surface use is allowed during March 15 – June 30, inside Connectivity Corridors, within four miles of an occupied lek (independent of habitat suitability). **Purpose**: To seasonally protect Greater Sage-Grouse breeding, nesting, and early brood-rearing habitats inside Connectivity Corridors from disruptive activities, within four miles of an occupied lek. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				Waiver: This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the described lands are no longer considered in the land use plan to be within a Greater Sage-Grouse designated Connectivity Corridor or are incapable of serving the long-term requirements of Greater Sage-Grouse breeding, nesting, or early brood-rearing habitat and that these ranges no longer warrant consideration as components of Greater Sage-Grouse breeding, nesting, or early brood-rearing habitat. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4024	NSO	SS Wildlife: general Greater Sage-Grouse breeding habitat	16,103 acres	**Stipulation**: Occupied Greater Sage-Grouse leks outside designated Core Population Areas and Connectivity Corridors. This area encompasses occupied Greater Sage-Grouse leks outside designated Core Population Areas and Connectivity Corridors. NSO or use is allowed within a one-quarter (0.25) mile radius of the perimeter of occupied Greater Sage-Grouse leks outside designated Core Population Areas and Connectivity Corridors, as mapped on the BFO GIS database. **Purpose**: To protect occupied Greater Sage-Grouse leks and associated seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse in proximity to leks, from habitat fragmentation and loss and Greater Sage-Grouse populations from disturbance outside designated Core Population Areas and Connectivity Corridors. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the area subject to the stipulation or the NSO criteria if an environmental record of review finds that a portion of the NSO area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver**: This stipulation may be waived over the entire lease if Greater Sage-Grouse are no longer a BLM sensitive or special status species and are not listed by the USFWS as Threatened or Endangered under the ESA. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4024	TLS	SS Wildlife: general Greater Sage-Grouse nesting and early brood-rearing habitat	779,834 acres	**Stipulation**: Greater Sage-Grouse breeding, nesting and early brood-rearing habitat outside designated Core Population Areas and Connectivity Corridors. This area encompasses Greater Sage-Grouse breeding, nesting and early brood-rearing habitat outside designated Core Population Areas and Connectivity Corridors. No surface use is allowed during March 15 – June 30, in Greater Sage-Grouse breeding, nesting and early brood-rearing habitats outside designated Core Population Areas and Connectivity Corridors, within two miles of an occupied lek. **Purpose**: To seasonally protect Greater Sage-Grouse nesting and early brood-rearing habitats from disruptive activities outside designated Core Population Areas and Connectivity Corridors, within two miles of an occupied lek. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				Waiver: This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the described lands are incapable of serving the long-term requirements of Greater Sage-Grouse breeding, nesting, or early brood-rearing habitat and that these ranges no longer warrant consideration as components of Greater Sage-Grouse breeding, nesting, or early brood-rearing habitat. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
SS WL-4026	NSO	SS Wildlife: bald eagle nesting habitat	7,710 acres	NSO or use is allowed within 0.5 mile of bald eagle nests. On the lands described below: NSO (1) as mapped on the BFO GIS database or determined by field evaluation, in coordination with the WGFD and/or USFWS. For the purpose of: NSO (2) ensuring productivity of bald eagles. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not disturb (as defined by the Bald and Golden Eagle Protection Act) nesting bald eagles. Bald eagles will not be agitated or bothered to a degree that causes or is likely to cause: ● physical injury, or ● a decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or ● nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation including topography, visibility, disturbance and human activity levels, and other factors. The stipulation may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within 0.5 mile of a bald eagle nest. Confirmation may include coordination with the WGFD or USFWS.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4026	TLS	SS Wildlife: bald eagle nesting	36,597 acres	Surface-disturbing and disruptive activities are prohibited or restricted from February 1 to August 15 within 1.0 mile of active bald eagle nests. On the lands described below: TLS (2) as mapped on the BFO GIS database or determined by field evaluation, in coordination with the WGFD and/or USFWS. For the purpose of: TLS (3) ensuring productivity of bald eagles. **Exception:** The BLM authorized officer may grant an exception if a staff review determines that the action will not disturb nesting bald eagles. This determination shall be based upon field study by a qualified representative, subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation including topography, visibility, disturbance and human activity levels, and other factors. The stipulation may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within 1.0 mile of a bald eagle nest. Confirmation may include coordination with the WGFD or USFWS.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4028	NSO	SS Wildlife: bald and golden eagle winter roosts	58,902 acres	NSO or use is allowed within 0.5 miles from the edge of consistently used bald or golden eagle winter roosts and the following consistently used riparian corridors: Clear Creek, Crazy Woman Creek, Piney Creek, Powder River, and Tongue River. On the lands described below: NSO (2) as mapped on the BFO GIS database or determined by field evaluation, in coordination with the WGFD and/or USFWS.. For the purpose of: NSO (3) protecting wintering bald and golden eagles. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not harm roosting eagles. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation including topography, visibility, disturbance and human activity levels, and other factors. The stipulation may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within 0.5 mile of a consistently used eagle roost or riparian corridor.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4028	CSU	SS Wildlife: bald and golden eagle winter roosting habitat	58,902 acres	Surface disturbance is restricted within 1.0 mile from the edge of consistently used bald or golden eagle winter roosts and the following consistently used riparian corridors: Clear Creek, Crazy Woman Creek, Piney Creek, Powder River, and Tongue River. CSU (1): (a) Prior to surface disturbance within 1.0 mile of consistently used bald and golden eagle winter roosts and riparian corridors a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that wintering eagles will not be disturbed (as defined by the Bald and Golden Eagle Protection Act). Bald or golden eagles will not be agitated or bothered to a degree that causes or is likely to cause: ● physical injury, or ● a decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior. On the lands described below: CSU (2) as mapped on the BFO GIS database or determined by field evaluation, in coordination with the WGFD and/or USFWS.. For the purpose of: CSU (3) protecting bald and golden eagle winter roosting habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not result in a failure to meet the performance standards above. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation including topography, visibility, disturbance and human activity levels, and other factors. The stipulation and performance standards identified above may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within 1.0 mile of a consistently used eagle winter roost or riparian corridor.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4028	TLS	SS Wildlife: bald and golden eagle winter roosting habitat	58,902 acres	Surface-disturbing and disruptive activities are prohibited or restricted from (1) November 1 to April 1 within 1.0 mile from the edge of consistently used eagle winter roosts and the following consistently used riparian corridors: Clear Creek, Crazy Woman Creek, Piney Creek, Powder River, and Tongue River. On the lands described below: TLS (2) as mapped on the BFO GIS database or determined by field evaluation, in coordination with the WGFD and/or USFWS. For the purpose of: TLS (3) protecting roosting eagles. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designated so that the action will not harm roosting eagles. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation including topography, visibility, disturbance and human activity levels, and other factors. The stipulation may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within 1.0 mile of a consistently used bald or golden eagle winter roost or riparian corridor.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4031	TLS	SS Wildlife: special status raptor nesting	701,847 acres	Surface-disturbing and disruptive activities are prohibited or restricted (1)within USFWS recommended spatial buffers and dates (Appendix K (p. 2161) or http://www.fws.gov/wyominges/Pages/Species/Species_SpeciesConcern/Raptors.html) of active raptor nests of special status species. On the lands described below: TLS (2) as mapped on the BFO GIS database or determined by field evaluation, in coordination with the WGFD and/or USFWS.. For the purpose of: TLS (3) ensuring productivity of nesting special status raptors. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not disturb nesting special status raptors. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation including topography, visibility, disturbance and human activity levels, and other factors. The stipulation may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within the USFWS recommended spatial buffer of a sensitive species raptor nest. This determination shall be based upon field studies of the area by a qualified representative and reviewed by BLM. The determination may include coordination with the WGFD or USFWS.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4032	NSO	SS Wildlife: special status raptor nests	701,847 acres	NSO or use is allowed within a species specific spatial buffer of special status species raptor nests using USFWS Wyoming Ecological Service's recommendations (Appendix K (p. 2161) or http://www.fws.gov/wyominges/Pages/Species/Species_SpeciesConcern/Raptors.html). On the lands described below: NSO (1) as mapped on the BFO GIS database or determined by field evaluation, in coordination with the WGFD and/or USFWS.. For the purpose of: NSO (2) protecting nest sites of special status raptors. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, or sited in a location, or a site-specific evaluation determines that nesting special status raptors will not be disturbed (agitated or bothered to a degree that causes or is likely to cause: physical injury; or a decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.) The determination may include coordination with the WGFD or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation including topography, visibility, disturbance and human activity levels, and other factors. The stipulation may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within the USFWS recommended spatial buffer of a sensitive species raptor nest. This determination shall be based upon field studies of the area by a qualified representative and reviewed by BLM. The determination may include coordination with the WGFD or USFWS.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4034	CSU	SS Wildlife: amphibian habitat	1,217,959 acres	Surface disturbance is restricted within 1,640 feet (500 meters) of perennial water, vernal pools, playas, and wetlands. CSU (1) (a) Prior to surface disturbance within 1,640 feet (500 meters) of perennial water, vernal pools, playas, and wetlands appropriate surveys must be conducted and a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator may not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan or approved it with conditions. (b) The Plan must demonstrate to the authorized officer's satisfaction that special status amphibian species will not be disturbed to a degree that causes or is likely to cause: ● physical injury, ● a decrease in productivity, by substantially interfering with normal breeding, sheltering, or hibernation behavior, or ● site abandonment, by substantially interfering with normal breeding, sheltering, or hibernation behavior. On the lands described below: CSU (2) as mapped on the BFO GIS database or determined by field evaluation, in coordination with the WGFD and/or USFWS. For the purpose of: CSU (3) ensuring production of special status amphibian species breeding, sheltering, and hibernation habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that the proposed action is of a scale, sited in a location, or otherwise designed so that the action will not result in a failure to meet the performance standards above. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation and performance standards identified above may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not include special status species amphibian habitat. This determination shall be based upon field studies of the area by a qualified representative and reviewed by BLM. The determination may include coordination with the WGFD or USFWS.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4034	CSU	SS Wildlife: reptile habitat	1,217,959 acres outcrops not mapped	Surface disturbance is restricted within 1,640 feet (500 meters) of south facing rock outcrops, perennial water, vernal pools, playas, and wetlands. CSU (1) (a) Prior to surface disturbance within 1,640 feet (500 meters) of south facing rock outcrops, perennial water, vernal pools, playas, and wetlands appropriate surveys must be conducted and a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator may not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan or approved it with conditions. (b) The Plan must demonstrate to the authorized officer's satisfaction that special status reptile species will not be disturbed to a degree that causes or is likely to cause: ● physical injury, ● a decrease in productivity, by substantially interfering with normal breeding, basking, sheltering, or hibernation behavior, or ● site abandonment, by substantially interfering with normal breeding, basking, sheltering, or hibernation behavior. On the lands described below: CSU (2) as mapped on the BFO GIS database or determined by field evaluation, in coordination with the WGFD and/or USFWS. For the purpose of: CSU (3) ensuring production of special status reptile species breeding, basking, sheltering, and hibernation habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that the proposed action is of a scale, sited in a location, or otherwise designed so that the action will not result in a failure to meet the performance standards above. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation and performance standards identified above may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not include special status species reptile habitat. This determination shall be based upon field studies of the area by a qualified representative and reviewed by BLM. The determination may include coordination with the WGFD or USFWS.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4034	CSU	SS Wildlife: bat habitat	115,196 acres	Surface disturbance is restricted within 1,640 feet (500 meters) of cave entrances, mature forest, and rock outcrops. CSU (1) (a) Prior to surface disturbance within 1,640 feet (500 meters) of cave entrances, mature forest, and rock outcrops appropriate surveys must be conducted and a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator may not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan or approved it with conditions. (b) The Plan must demonstrate to the authorized officer's satisfaction that special status bat species will not be disturbed to a degree that causes or is likely to cause: ● physical injury, ● a decrease in productivity, by substantially interfering with normal breeding, nursery, roosting, or hibernation behavior, or ● site abandonment, by substantially interfering with normal breeding, nursery, roosting, or hibernation behavior. On the lands described below: CSU (2) as mapped on the BFO GIS database or determined by field evaluation, in coordination with the WGFD and/or USFWS. For the purpose of: CSU (3) ensuring production of special status bat species breeding, nursery, roosting, and hibernation habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that the proposed action is of a scale, sited in a location, or otherwise designed so that the action will not result in a failure to meet the performance standards above. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation and performance standards identified above may be modified based on monitoring results. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not include special status species bat habitat. This determination shall be based upon field studies of the area by a qualified representative and reviewed by BLM. The determination may include coordination with the WGFD or USFWS.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
Cultural-5006	NSO	Cultural: historic properties	15,382 acres	NSO or use (NSO) (1) is allowed within the following historic properties: Pumpkin Buttes, Cantonment Reno, Dull Knife Battle, Crazy Woman Battle, contributing and unevaluated segments of the Bozeman Trail, all rock art sites, all rock shelter sites, all Native American burials. On the lands described below: NSO (2) as mapped on the BFO GIS database. For the purpose of: NSO (3) protecting historic properties. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so it will not be placed within the actual boundaries of or will not disturb the site within the defined NSO area. **Modification:** The BLM authorized officer may modify the stipulation in consultation with State Historic Preservation Office (SHPO), applicable tribes, and other interested parties, if the site is no longer considered eligible under National Register of Historic Places (NRHP) or if, in consultation with SHPO, applicable Indian tribes, and other interested parties it is determined that the identified property's sacred, spiritual, and/or traditional values have been downgraded and/or the tribes have reduced the previous avoidance distance around the site. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined in consultation with SHPO, applicable Indian tribes, and other interested parties, that the identified site is no longer considered sacred, spiritual, and/or traditional.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
Cultural-5006	CSU	Cultural: historic property setting	613,601 acres	Surface disturbance is restricted within three miles of the following historic properties: Pumpkin Buttes, Cantonment Reno, Dull Knife Battle, Crazy Woman Battle, contributing and unevaluated segments of the Bozeman Trail, all rock art sites, all rock shelter sites, all Native American burials. CSU (1) (a) Prior to surface disturbance within three miles of the identified historic properties a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator may not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan or approved it with conditions after consultation with SHPO, applicable Indian tribes, and other interested parties. (b) The Plan must demonstrate to the authorized officer's satisfaction that there will be no adverse effects to NRHP eligible or listed historic properties (i.e., the infrastructure will either not be visible or will result in a weak contrast rating). On the lands described below: CSU (2) as mapped on the BFO GIS database. CSU (3) ensuring the setting of historic properties. **Exception:** The BLM authorized officer may grant an exception if , after consultation SHPO, applicable Indian tribes, and other interested parties, it is determined that the proposed action will result in a no adverse effect determination to the sacred, spiritual, and/or traditional nature of the property(s) (i.e., will not result in a more than a weak contrast rating). **Modification:** The BLM authorized officer if, in consultation with SHPO, applicable Indian tribes, and other interested parties, the site is no longer considered eligible under NRHP or if, in consultation with Indian tribes and/or SHPO, it is determined that the identified property's sacred, spiritual, and/or traditional values have been downgraded and/or the tribes have reduced the previous avoidance distance around the site. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined, in consultation with SHPO, applicable Indian tribes, and other interested parties, that the identified site is no longer considered sacred, spiritual, and/or traditional.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
Cultural-5011	NSO	Cultural: traditional cultural properties	15,382 acres	NSO or use is allowed on lands containing traditional cultural properties. NSO (1) On the lands described below: NSO (2) as mapped on the BFO GIS database. For the purpose of: NSO (3) protecting traditional cultural properties. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so it will not be placed within the actual boundaries of or will not disturb the site within the defined NSO area. **Modification:** The BLM authorized officer if, in consultation with SHPO, applicable tribes, and other interested parties, the site is no longer considered eligible under NRHP or if, in consultation with SHPO, applicable Indian tribes, and other interested parties it is determined that the identified property's sacred, spiritual, and/or traditional values have been downgraded and/or the tribes have reduced the previous avoidance distance around the site. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined, in consultation with SHPO, applicable Indian tribes, and other interested parties, that the identified site is no longer considered sacred, spiritual, and/or traditional.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
Cultural-5011	CSU	Cultural: traditional cultural property setting	613,601 acres	Surface disturbance is restricted within three miles of traditional cultural properties. CSU (1) (a) Prior to surface disturbance within three miles of traditional cultural properties a mitigation plan (Plan) must be submitted by the applicant. The Plan must be approved or approved with conditions by the BLM authorized officer prior to surface-disturbing activities after consultation with SHPO, applicable Indian tribes, and other interested parties. (b) The Plan must demonstrate there will be no adverse effects to NRHP eligible or listed historic properties (i.e., proposed infrastructure is either not visible or will result in a weak contrast rating) On the lands described below: CSU (2) as mapped on the BFO GIS database. For the purpose of: CSU (3) ensuring the setting of traditional cultural properties. **Exception:** The BLM authorized officer may grant an exception, after consultation SHPO, applicable Indian tribes, and other interested parties, it is determined that the proposed action will result in a no adverse effect determination to the sacred, spiritual, and/or traditional nature of the property(s). **Modification:** The BLM authorized officer may modify the stipulation, if in consultation with SHPO, applicable Indian tribes, and other interested parties, the site is no longer considered eligible under NRHP or if, in consultation with Indian tribes and/or SHPO, it is determined that the identified property's sacred, spiritual, and/or traditional values have been downgraded and/or the tribes have reduced the previous avoidance distance around the site. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined, in consultation with SHPO, applicable Indian tribes, and other interested parties, that the identified site is no longer considered sacred, spiritual, and/or traditional.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
Paleo-5007	NSO	Paleontology: high quality or important resources	860 acres	NSO or use is allowed on lands containing paleontological resources of high quality or importance. On the lands described below: NSO (1) as mapped on the BFO GIS database. For the purpose of: NSO (2) protecting paleontological resources of high quality or importance. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will protect paleontological resources of high quality or importance. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation may be modified based on monitoring results. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not contain paleontological resources of high quality or importance.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
VRM-5005	CSU	Visual: Class II and Special Emphasis Areas	112,329 acres	Surface disturbance is restricted within Visual Resource Management (VRM) Class II areas. CSU (1) Prior to surface disturbance within VRM Class II areas, a site-specific plan must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the plan (with conditions, as appropriate). The plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: ● A visual contrast rating must demonstrate that VRM Class II objectives will be met. ● Where required by the BLM authorized officer, a visual simulation must be prepared and must demonstrate that VRM Class II objectives will be met through practices such as siting of permanent facilities. ● Where present and feasible, existing surface disturbances shall be utilized; new surface disturbances shall be minimized to the extent practicable. ● All permanent above-ground facilities (such as production tanks or other production facilities) not having specific coloration requirements for safety must be painted or designed using a BLM-approved color. On the lands described below: CSU (2) as mapped on the BFO GIS database. For the purpose of: CSU (3) protecting Class II VRM Areas. **Exception:** The BLM authorized officer may grant an exception if it is demonstrated through a BLM-approved visual simulation and contrast rating worksheet that the project or identified mitigation will meet or exceed VRM Class II objectives. This restriction does not apply to temporary structures such as drilling rigs. **Modification:** The BLM authorized officer may modify the area subject to the stipulation if it is demonstrated that VRM Class II objectives have been modified through appropriate RMP planning procedures, or if a portion of the lease is not located within a VRM Class II area. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire leasehold is no longer managed for VRM Class II objectives based on planning, or if the entire leasehold is not located within a Class II area.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
Rec-6019	CSU	Recreation: Special Recreation Management Areas	9,504 acres	Surface disturbance is restricted within the Special Recreation Management Areas (SRMA) available for leasing (Weston Hills). CSU (1) (a) Prior to surface disturbance within SRMAs available for leasing a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that the proposed action is consistent with the prescribed management for the SRMA. On the lands described below: CSU (2) as mapped or determined by BLM. For the purpose of: CSU (3) ensuring the recreational opportunities and setting of the SRMA. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will meet the management objectives, the recreational opportunities, and setting of the SRMA. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation may be modified based on monitoring results, or if a portion of the area is no longer located within a SRMA. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area is not within a SRMA.
ACEC-7003	NSO	ACEC: Pumpkin Buttes	1,731 acres	NSO or use is allowed within the Pumpkin Buttes Area of Critical Environmental Concern. On the lands described below: NSO (2) as mapped or determined by BLM. For the purpose of: NSO (3) protecting the relevant and important values. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not result in a failure to protect the relevant and important values. The Plan may be subject to consultation with Wyoming SHPO, applicable tribes, and other interested parties.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				Modification: The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation may be modified based on monitoring results, or if a portion of the lease is no longer located in the Pumpkin Buttes ACEC. **Waiver:** The BLM authorized officer may waive this stipulation if it is determined that the entire lease area does not contain relevant and important ACEC values, subject to consultation with Wyoming SHPO, applicable tribes, and other interested parties.

H.3. Processing Exceptions, Modifications, and Waivers

An exception, waiver, or modification must be based on one of two criteria. According to 43 CFR 3101.1-4, "A stipulation included in an oil and gas lease shall be subject to modification or waiver only if the authorized officer determines that the factors leading to its inclusion in the lease have changed sufficiently to make the protection provided by the stipulation no longer justified or if the proposed operations would not cause unacceptable impacts." Waiver, exceptions, or modifications must be supported by appropriate environmental analysis and documentation.

The person requesting the exception, modification, or waiver is responsible to submit a written request including information that might assist the authorized official in making a decision. The authorized officer will review the information submitted in support of the request along with other pertinent information. Requests must be submitted to the BLM field office (Buffalo) in which the lease is located. Modification and waiver requests will be forwarded to the BLM-Wyoming Deputy State Director for Minerals and Lands along with the Buffalo Field Office (BFO)'s recommendation. Requests shall be subject to at least a 30 day public review if the authorized officer determines that a stipulation involves an issue of major concern to the public (43 CFR 3101.1–4).

The request is considered a unique action and is analyzed and documented individually for RMP and NEPA compliance. Processing may include coordination or consultation with the Wyoming Game and Fish Department (WGFD), U.S. Fish and Wildlife Service (USFWS), SHPO, or other agencies. For example, requests will not be granted for stipulations designed to protect Threatened and Endangered species, unless the BLM consults with the USFWS and reinitiates consultation, if necessary. Consultation with other agencies require additional time and resources to process.

The request must include the lease number and effective date, the stipulation(s) the request is for, the change in circumstances that lead the lessee or operator to believe the request is appropriate, and the name and/or number of any applicable authorization(s) (i.e., APD, sundry, right-of-way). A map is strongly recommended. The following information must be addressed, when applicable, in the written request:

1. **WHY** the public land user wants the request. For example with a timing limitation exception request, include the reason(s) why an action could not be completed within the original stipulation period, any evidence of why the action would not adversely affect the resource or species being protected, or any other information (additional mitigation measures or alternatives) that would help the BLM (and WGFD or USFWS) in reviewing the request.

2. **WHO** is filing the request. This must include the company name, the name of the contact person, and the address, telephone number, e-mail address (if available), and fax number of the contact person.

3. **WHAT** is being requested. For example with a timing limitation request, include a detailed description of the activity including types of equipment or vehicles required and the number of trips expected.

4. **WHERE** the activity would take place. This must include the legal description of the activity and a map clearly depicting these areas. Proponent prepared Geographic Information System layers meeting BLM requirements can expedite the processing.

5. **WHEN** the activity would occur and it's duration. This must include the start date, end date, and time of day/night when activities would occur.

Requests must be made in writing and hard copy delivered to the Buffalo Field Manager at the physical address of the office. When time is of the essence, the process may be initiated by fax or electronic delivery of a scanned copy but the original must be received by the BFO within three working days. No exception, waiver, or modification will be issued until the hard copy request is received.

An exception request must be initiated near the time of the proposed activity. As a general rule, the request should be made within two weeks of conducting the proposed activity. The unpredictability of weather, animal movement and condition, and so on precludes analysis of requests related to wildlife far in advance of the time periods in question. The BLM uses a set of criteria when considering an exception request. Professional judgment plays a key part in the BLM's decisions on whether to grant exceptions. There is no clear-cut formula.

The following example describes some of the factors considered by the BLM when determining whether a request for a big game winter range timing limitation exception should be granted.

Factors Considered

1. Resource Concern
   - Animal presence or absence
   - Additional or new resource concerns
   - Potential for increased wildlife accidents or poaching

2. Animal Conditions
   - Physical condition of individual animals (e.g., fat reserves)
   - Local animal population condition (animal density)
   - Potential for additive mortality
   - Likelihood of introduction or increased incidence of disease
   - Likelihood of decreased recruitment/natality

3. Climate/Weather
   - Snow conditions (depth, crusting, longevity)
   - Current and historic local precipitation patterns
   - Current and historical seasonal weather patterns
   - Recent and current wind-chill factors (indication of animals energy use)
   - Duration of condition

- Short- and long-range forecasts

4. Habitat Condition and Availability
   - Water and forage condition (availability, quality, and quantity)
   - Competition (interspecific, intraspecific)
   - Animal use of available forage
   - Suitable and ample forage immediately available and accessible

5. Spatial Considerations
   - Migration/travel corridors
   - Winter range, foraging, calving or breeding
   - Topography (plains vs. mountains)
   - Topographic/geographic limitations (barriers)
   - Presence of thermal cover (e.g., protection from wind)
   - Proportion of range impacted
   - Juxtaposition and density of other activities/disturbances in the vicinity
   - Cumulative impacts

6. Timing
   - When proposed activity would occur in the stipulation period
   - Kind and duration of potentially disruptive activity
   - Likelihood of animals habituating to the proposed activity

A determination will be fully documented in the case file with an appropriate level of environmental review after asking not one, but a series of questions, such as:

- Would the BLM remain in compliance with laws and regulations?
- Is the proposal in conformance with the objectives of the RMP?
- What would be the level of harm to the protected resource, both locally and regionally?
- What would be the economic or public safety concerns if an active operation near completion was shut in to comply with a seasonal closure? (For example: economic, multi-stage fracturing not completed; safety, casing and cementing of fresh water zones not completed.)
- Are the impacts temporary, rather than long term?
- Is the resource being protected rare, or is it relatively common? Is it a special status species?
- Based on existing knowledge of a species and its use of an area, would impacts be confined to single or a small number of individuals, or would there be impacts on local or regional populations?
- Would impacts be allowed under existing law and policy?
- Is offsite mitigation an appropriate option? (For example, where individual or cumulative impacts cannot be effectively mitigated on site?)
- Can the impacts be reduced to an acceptable level through intensive use of environmental Best Management Practices?

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Appendix I. Biological Assessment

Note: This appendix was added following the release of the Buffalo Draft Resource Management Plan and Environmental Impact Statement.

I.1. Introduction

Endangered Species Act (ESA) Section 7 requires that federal agencies (such as the Bureau of Land Management [BLM]) consult with the United States (U.S.) Fish and Wildlife Service (USFWS) and address the potential effects of their proposed actions on plant and animal species listed or proposed for listing in accordance with the ESA. The BLM sent a scoping letter in November of 2008 to the USFWS requesting comments concerning Section 7 consultation for the Buffalo Resource Management Plan (RMP). The BLM Buffalo Field Office (BFO) has received several letters containing the Service's comments on (1) Threatened, Endangered, Proposed, and Candidate species updates, (2) migratory birds, and (3) wetlands and riparian areas. The latest of these letters, received on July 26, 2011, provided the most current list of species likely to occur in the BFO, for evaluating BLM Section 7 responsibilities. Two species, the Ute ladies'-tresses orchid, a Threatened plant, and Greater Sage-Grouse, a Candidate species for Threatened status, were included. On October 2, 2013, the USFWS proposed the northern long-eared bat (*Myotis septentrionalis*) for listing as endangered under the ESA (78 Federal Register [FR] 61045); the bat was added to the species list for Campbell County by Wyoming Ecological Services.

The BLM has prepared a Biological Assessment (BA) to evaluate the potential effects of the BLM proposed action (RMP Revision) on ESA-listed species and designated critical habitats occurring or affected by activities within the planning area. The action agency, in this case the BLM, has documented the determination of potential effects within the BA (50 Code of Federal Regulations [CFR] Part 402). If the BA determines that the proposed action may affect a listed species or modify its critical habitat, the BLM must enter into consultation with the USFWS. The BLM and USFWS discuss the proposed action, proposed conservation measures, and any other relevant issues. Depending on the level of effect to the species or its critical habitat, the USFWS prepares a concurrence letter (informal consultation) or a Biological Opinion (BO) (formal consultation). The consultation process with the USFWS ensures that BLM actions minimize impacts to listed species and designated critical habitats.

Federal action agencies may address rare, sensitive, Candidate, or Proposed species within the BA. Inclusion of non-ESA-listed species for the purpose of conference with the FWS can facilitate future consultations should one of these species become listed. Northern long-eared bat is included within the BA for this reason. Conservation measures identified in the BA are BLM management commitments regardless of whether consultation occurs or not.

The Buffalo Proposed RMP Revision analyzes the proposed plan to revise the existing Land Use Plan for the Buffalo, Wyoming, planning area. The BLM administers public lands in the planning area according to the Buffalo RMP (BLM 1985). The process for the development, approval, maintenance, and amendment or revision of an RMP and associated Environmental Impact Statement (EIS) is initiated under the authority of Section 202(f) of the Federal Land Policy and Management Act (FLPMA) of 1976 and Section 202(c) of the National Environmental Policy Act (NEPA). The process is guided by BLM planning regulations in Title 43 of the CFR, part 1600 (43 CFR 1600) and the Council on Environmental Quality (CEQ) regulations in 40 CFR

1500. The purpose, or goal, of the Land Use Plan is to ensure lands administered by the BLM are managed in accordance with the FLPMA and the principles of multiple use and sustained yield.

The existing plan has been updated and amended since the BLM adopted it. The Buffalo RMP Revision is scheduled for completion in 2014. When complete, the Buffalo RMP Revision will replace the existing RMP, updates, and amendments. Revising an existing land use plan is a major federal action for the BLM. NEPA, as amended, requires federal agencies to prepare an EIS for major federal actions. The RMP and EIS analyze the impacts of four alternative RMPs for the planning area, including the No Action Alternative, the Proposed RMP, and two other action alternatives. This BA analyzes the effects of the Proposed RMP on listed species, the Ute ladies'-tresses orchid, and proposed species, the northern long-eared bat.

The purpose of the Buffalo RMP is to provide a comprehensive and environmentally adequate framework for managing and allocating uses of the BLM-administered public lands and resources in the planning area. The planning area covers approximately 7.3 million acres of federal, state, and private lands in three Wyoming counties (Campbell, Johnson, and Sheridan). Of the total area, 782,102 acres are BLM surface and 4.8 million acres are federal mineral estate.

The objectives of the Buffalo RMP are to provide specific management direction to prevent or address potential conflicts among energy resources development, recreational activities, livestock grazing management, important wildlife habitats, and other important land and resource uses in the planning area, and to determine the appropriate levels and timing of these activities. Section 6.0, Analysis of Proposed Management Actions and Effects, in this BA identifies and analyzes the effects of the proposed management actions for each major functional activity (e.g., air quality, cultural resources, livestock grazing management, etc.) and additional conservation measures applicable to each major functional activity.

Proposed RMP

The Proposed RMP generally increases conservation of physical, biological, and heritage and visual resources compared to current management, including the designation of seven Special Recreation Management Areas (SRMAs) and two Areas of Critical Environmental Concern (ACECs). The Proposed RMP also emphasizes moderate constraints on resource uses through reclamation and mitigation requirements to reduce impacts to resource values.

Resource Uses and Support

Under the Proposed RMP, 4,720,586 acres are available for locatable mineral entry, while 82,691 acres are recommended for withdrawal. Existing withdrawals and segregations not carried forward are allowed to expire. In addition, approximately 72,276 acres of federal mineral estate are closed to oil and gas leasing in the planning area. The remaining federal mineral estate in the planning area is open to oil and gas leasing subject to the following constraints: 135,909 acres are subject to the standard lease terms, 104,927 acres are subject to minor constraints, 2,516,826 acres are subject to moderate constraints, and 556,592 acres are subject to major constraints. The Proposed RMP makes 2,725,060 acres available for mineral materials sales and closes 623,061 acres to mineral materials sales.

Land resource program actions under the Proposed RMP identify 120,722 acres of BLM-administered surface in the planning area as available for disposal. Under the Proposed RMP, the BLM administers 321,149 acres as right-of-way (ROW) avoidance/mitigation areas and 79,777 acres as ROW exclusion areas. Under the Proposed RMP, 55,516 acres are open to

renewable energy development. Travel management designations under the Proposed RMP include 37,389 acres closed to motorized vehicle use and 661,726 acres limited to designated roads and trails.

The Proposed RMP designates recreation management areas, including SRMAs and extensive recreation management areas (ERMAs). Other resource uses, such as minerals development, are typically allowed in these areas if adverse impacts can be mitigated. A surface occupancy prohibition may be applied to developed recreation sites, regional trails, local trail systems, and interpretive sites with exceptional recreation value. Under the Proposed RMP, the BLM designates seven SRMAs – Burnt Hollow (17,280 acres), Dry Creek Petrified Tree (2,567 acres), Middle Fork Canyon (10,083 acres), Mosier Gulch (1,026 acres), Welch Ranch (1,748 acres), Weston Hills (9,504 acres), and Hole-In-The-Wall (11,952 acres). Under the Proposed RMP, the BLM closes 16,960 acres in the planning area to livestock grazing. However, grazing may be used in closed areas as a tool to maintain or improve resource conditions. To reduce user conflict, new resource uses are mitigated to minimize or avoid conflict with livestock grazing.

Special Designations
No ACECs currently exist within the planning area. The Proposed RMP includes two new ACECs. The two proposed ACECs are Pumpkin Buttes and Welch Ranch. The Proposed RMP evaluates Hazelton Road, Slip Road, Trabing/Sussex Road, Powder River Road, Rome Hill Road, and Tipperary/Thompson Road as Back Country or Scenic Byways. The BLM manages the Middle Fork Powder River as a Wild and Scenic River (WSR). The Proposed RMP retains the previous decision that closes three Wilderness Study Areas (WSAs) to motorized vehicle use and manages them to preserve wilderness characteristics.

Physical, Biological, and Heritage Resources
Under the Proposed RMP, management emphasizes moderate constraints on resource uses and mitigation of impacts to conserve physical resources. Reclamation practices include beginning interim and final reclamation at the earliest feasible times, and in disturbed areas, reestablishing healthy native or desired plant communities based on predisturbance/desired plant species composition. The BLM requires site-specific stabilization and reclamation plans, stipulations, or measures before it will authorize surface-disturbing activities. Under the Proposed RMP, the BLM assesses erosion and soil stability during rangeland health evaluations, and allows the surface discharge of produced water from new activities where compatible with other resource objectives.

Management of biological resources under the Proposed RMP emphasizes protection of these resources through avoidance and mitigation of surface-disturbing activities and moderate resource constraints. For example, surface-disturbing activities are to avoid riparian/wetland areas by 500 feet. The BLM allows aerial application of pesticides on a case-by-case basis. Vegetation resources are managed for a full range of diverse native species, composition, densities, and age classes across the landscape. For fish species, the BLM avoids surface-disturbing activities within 0.25 mile of any naturally occurring water bodies containing native or desirable non-native fish species unless fish resources objectives can be met. Seasonal wildlife restrictions under the Proposed RMP include a mix of controlled surface use (CSU), timing limitation stipulations (TLS), and no surface occupancy (NSO) stipulations for fluid mineral leasing; corresponding restrictions are placed on all surface-disturbing activity authorizations.

The Proposed RMP generally protects special status species. Greater Sage-Grouse are managed in accordance with Wyoming's Core Population Area strategy as defined in Wyoming Executive Order 2011-5 and BLM Wyoming IM-2012-019. Greater Sage-Grouse constraints on resource

uses are greater in Core Population Areas and Connectivity Corridors (Priority Habitat) than outside them. For example, the BLM applies an NSO stipulation to prohibit surface-disturbing activities within 0.6 mile of Greater Sage-Grouse leks in Core Population Areas and Connectivity Corridors and within 0.25 mile of Greater Sage-Grouse leks outside Core Population Areas and Connectivity Corridors (general habitat). The BLM also applies a goal of consolidating development to maintain Greater Sage-Grouse habitat and includes provisions for Greater Sage-Grouse habitat restoration on qualifying public lands. To protect raptor nesting habitat, the BLM applies USFWS Wyoming Ecological Service's species-specific protective buffers around active raptor nests. The BLM manages energy projects and grazing to protect special status plant populations.

Under the Proposed RMP, the BLM protects historically important cultural sites up to 3 miles, using best management practices (BMPs) to avoid or mitigate adverse impacts from mineral development or other surface-disturbing activities. The BLM attaches standard Paleontological Resources Protection Stipulations to authorizations for surface-disturbing activities on Potential Fossil Yield Classification (PFYC) 4 or 5 formations and requires an on-the-ground survey before it will approve surface-disturbing activities or land-disposal actions. The BLM would monitor surface-disturbing activities for PFYC 3, 4, and 5 formations on a case-by-case basis. The BLM allows surface-disturbing activities within 100 feet of a paleontological locality if the impacts can be adequately mitigated.

Under the Proposed RMP, the BLM manages the following visual resource management (VRM) class allocations for BLM surface in the planning area: 112,329 acres of VRM Class II, 379,429 acres of VRM Class III, and 260,238 acres of VRM Class IV.

I.2. Consultation and Biological Assessment Objectives

Under provisions of the ESA, as amended (16 United States Code [U.S.C.] 1531 et seq.), federal agencies are directed to conserve Threatened and Endangered species and the habitats in which these species are found. Federal agencies also are required to ensure actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of Endangered and Threatened species or their critical habitats. The ESA requires action agencies, such as the BLM, to consult or conference with the USFWS and/or the National Marine Fisheries Service when there is discretionary federal involvement or control over the action. Formal consultation becomes necessary when the action agency requests consultation after determining the Proposed RMP is likely to adversely affect listed species or critical habitats, or the aforementioned federal agencies do not concur with the action agency's finding (USFWS and U.S. National Marine Fisheries Service 1998). Under the 1994 Memorandum of Understanding (MOU) and the 2000 Memorandum of Agreement among the BLM, the U.S. Department of Agriculture (USDA) U.S. Forest Service (USFS), the USFWS, and the National Marine Fisheries Service, all four agencies agreed to promote the conservation of Candidate and Proposed species and streamline the Section 7 consultation and coordination process.

This programmatic BA provides documentation for the Proposed RMP to meet federal requirements and agreements among the federal agencies identified above. It addresses federally listed Threatened, Endangered, and Proposed species and is prepared under 1973 ESA Section 7 regulations, in accordance with USFWS and National Marine Fisheries Service 1998 procedures, and in accordance with the 1994 MOU and 2000 Memorandum of Agreement. As appropriate, the BLM will perform site-specific evaluations for activities authorized under the Proposed RMP. The BLM will consult or conference with the USFWS for activities authorized under the Proposed

RMP that may affect Threatened, Endangered, or Proposed species. In addition, in compliance with BLM Manual 6840, the BLM will address potential effects to special status species.

Objectives of this BA include the following:

- Summarize the biology, distribution, and habitats of species listed or proposed as Threatened or Endangered occurring in the planning area.
- Assess the past, current, and future effects (direct and indirect) of the proposed RMP actions to the species.
- Assess the cumulative effects of state and private actions on the subject species.
- Make an effect determination for each species based on the actions identified in the RMP.
- Document conservation measures to foster the welfare of the subject species.
- Predict the expected future status of the subject species based on the effects analysis.

The outcome of this BA will determine the need for, and type of, consultation and/or conferencing with the USFWS. In addition, during implementation of specific actions identified in the RMP, potential effects to federally listed species will be evaluated again, and any necessary consultation with the USFWS will be initiated, as appropriate.

Emergency consultation may be necessary when emergency actions (i.e., wildland fires, disasters, casualties, national defense or security emergencies, including response activities taken to prevent imminent loss of human life or property) may affect listed species and/or critical habitats, and the federal action agency does not have the time for the normal ESA- or NEPA-required administrative work prior to action. Emergency consultations will consider the action agency's critical mission, while ensuring that anticipated actions will not violate ESA section 7(a)(2) or 7(d).

I.3. Overview of the Planning Area

This RMP planning effort will address lands within the Buffalo planning area in north-central Wyoming. The planning area covers 782,102 acres of public surface land (RMP Map 1) and 4.8 million acres of federal mineral estate (RMP Map 2) in three counties (Table I.1, "BLM Surface and Federal Mineral Estate within the Buffalo Planning Area" (p. 2029)). BLM surface in the planning area is in scattered tracts intermingled with state and private lands. The southern Big Horn Mountains, the Powder River Breaks, the Rochelle Hills, and some areas in northeast Campbell County contain larger blocks of BLM surface.

Table I.1. BLM Surface and Federal Mineral Estate within the Buffalo Planning Area

County	BLM Surface Estate (acres)	Federal Mineral Estate (acres)
Campbell	223,994	2,418,761
Johnson	504,325	1,682,668
Sheridan	53,724	701,848
Total	782,102	4,803,277
Source: BLM Land Tenure database.		

The planning area is part of the Missouri Plateau of the Great Plains. This region is characterized by rolling hills that have been greatly dissected by tributaries of the Missouri River system. The Big Horn Mountains, which are part of the Rocky Mountains, lie along the western-most portion

of the planning area. On the east, the planning area is bounded by the Black Hills. On the south, the planning area is bounded by the Casper Arch, the Laramie Mountains, and the Hartville Uplift.

The planning area consists of a dissected, rolling upland plain, with low to moderate relief, broken by buttes, mesas, hills, and ridges. Extensive areas of open high hills in the northern portion of the planning area indicate rough, broken terrain where moderate to deep erosion has occurred. Erosion-resistant clinker, produced by the natural burning of coalbeds, caps many hills and ridges in the planning area with a characteristic broken, red brick or scoria-like rock. Elevations in the planning area range from 3,350 to 9,250 feet above mean sea level.

The planning area is drained toward the north and east by the Tongue, Powder, Little Powder, Belle Fourche, and Cheyenne Rivers, which all flow into the Missouri River system. The planning area forms a low divide among these smaller drainage systems. The major river valleys have wide flat forms and broad floodplains. Tributaries in the planning area are incised and drain areas of isolated, flat-topped, clinker-covered buttes and mesas, 100 to 500 feet above the valley floor. Flow in the planning area is generally toward the northeast. Perennial streams generally originate in the mountainous areas because of substantial annual precipitation and geologic conditions that foster discharge of groundwater.

Surface water quality in the planning area is generally adequate to support designated uses. Surface waters in the planning area are typically alkaline, with moderate to high levels of hardness. These waters vary from a calcium bicarbonate type in the mountain streams, to a sodium sulfate type in the lowlands. Surface water quality in the planning area is affected by depletions and return flows from irrigation. Surface water in the planning area is withdrawn to support agricultural, domestic, and stock water uses. Irrigation accounts for about 98% of surface water withdrawals in the planning area.

The groundwater resources of the planning area that are at or near the land surface are contained in unconsolidated Quaternary alluvial or basin fill deposits or in semi-consolidated lower Tertiary sandstones and coalbeds that are the uppermost aquifers in the Northern Great Plains aquifer system. Clinker, which also can make up an aquifer, has formed some of the lower Tertiary sediments. The Lower Tertiary Aquifer System consists of the Wasatch aquifers, the Fort Union aquifers contained in the Tongue River member of the Fort Union Formation, the Lebo confining layer, and the Tullock aquifer.

The planning area contains some of the largest accumulations of low-sulfur sub bituminous coal in the world. Thick coal deposits occur at or near the surface along the eastern boundary of the planning area, along a north-south trend situated west of both Gillette and Wright, and in the northwestern portion of the planning area near Sheridan. Important coal seams within the Wasatch Formation, from oldest to youngest, include the School, Badger, Felix, and Lake DeSmet. Additionally, there are several world-class deposits currently being mined in Wyoming from 13 mines along the north-south trend known as the Gillette Coal Field. These mines are producing coal from seams within the Fort Union Formation. Over the years numerous names, both official and unofficial, have developed for these seams. The most recently revised coal stratigraphy in the Fort Union Formation, from oldest to youngest, includes the Lower Wyodak, Upper Wyodak, and Smith Seams (Flores et al. 2010). Although these are the currently accepted names for these coals, industry continues to use the following naming convention: Big George (Lower Wyodak equivalent), Canyon (Lower Wyodak equivalent), Anderson (Upper Wyodak equivalent), and Roland (Smith equivalent).

The planning area is characterized as a mosaic of vegetation types that includes prairie grasslands, shrublands, riparian areas, and forested areas. Twelve vegetation types were identified in the planning area. They are mixed-grass prairie, wet meadow, herbaceous riparian, sagebrush shrubland, other shrubland, shrubby riparian coniferous forest, aspen, forested riparian, agriculture, urban/disturbed, barren, and water. Those broad categories often represent several vegetation types that were similar in terms of dominant species and ecological importance.

All of the vegetation types present in the planning area provide habitats for some species of wildlife. When they are undisturbed, the major vegetation types in the planning area provide high-quality habitats for many species of wildlife. Because these habitats tend to occur in a mosaic across the landscape, many species of wildlife can be expected to use more than one habitat. Primary wildlife species and guilds of concern in the planning area include pronghorn, mule deer, white-tailed deer, elk, moose, Greater Sage-Grouse, sharp-tailed grouse, reptiles, amphibians, bats, and various raptors and other migratory birds. Perennial streams in the planning area support a diverse fish fauna of game and non-game species.

Not surprisingly, the planning area supports a variety of special status species that are of concern to other management agencies. These species of plants and animals include one listed as Threatened (Ute ladies'-tresses orchid), one Proposed for listing as Endangered (northern long-eared bat), and one Candidate for listing as Threatened (Greater Sage-Grouse). They also include species that the BLM or the Wyoming Game and Fish Department (WGFD) consider rare or sensitive.

Land ownership in the planning area consists primarily of private lands intermingled with federal (approximately 11% BLM) and state lands. Mineral ownership in the planning area consists primarily of federal mineral estates (approximately 60%). Rangeland livestock grazing and oil and gas development are the dominant land use for both public and private lands in the planning area.

The planning area encompasses all or portions of Campbell, Johnson, and Sheridan Counties in Wyoming. It also includes five incorporated municipalities: Gillette, Wright, Sheridan, Kaycee, and Buffalo. Gillette is the county seat and the largest incorporated city in Campbell County. Wright is in southern Campbell County. Sheridan is the county seat of Sheridan County. Buffalo is the largest incorporated city and county seat of Johnson County. Kaycee is in southern Johnson County.

Gillette and Sheridan are the hubs for the transportation network in the planning area. Interstate highways in the planning area include Interstate (I)-25 and I-90. The major north-south transportation corridors include State Route 59 in Campbell County, and I-25/I-90 in Johnson and Sheridan Counties. The principal east-west highway is I-90 through Campbell and Johnson Counties. I-90 turns north at Buffalo continuing to Sheridan, and into Montana. U.S. Highways in the planning area are U.S. Routes 14 and 16 running east-west, and 87 running north-south paralleling I-25 and I-90. The primary state highways that traverse the planning area are Routes 59 and 387. Secondary state highways that traverse the planning area include Routes 50, 51, 192, 196, 338, and 450. Numerous county roads also provide local access to public and private lands in the planning area. The coalbed natural gas (CBNG) boom of 2000-2008 created a "spider-web" of roads throughout the vast majority of the planning area.

Oil and gas pumping units and associated well pads, pipelines, powerlines, and access roads are evident throughout the planning area. The landscape that has resulted from oil and gas development in the planning area is rural and/or industrial.

Most of the areas with significant scenic values occur in the western part of the planning area. The South Big Horns area is located in the southwestern quarter of Johnson County, primarily within the Middle Fork Powder River sub-watershed. The area provides sensitive and unique resource values, including scenery. Management emphasis areas within the South Big Horns Area include the Middle Fork Recreation Area, the Red Wall/Hole-in-the-Wall Area, Outlaw Cave, the Dull Knife Battlefield site, and the Gardner Mountain and North Fork WSAs. The Powder River Breaks in eastern Johnson County, Fortification Creek, and the Weston Hills Recreation Area in the eastern part of the planning area also provide scenic settings for a variety of dispersed recreational activities. The Burnt Hollow Management Area is a recently acquired parcel totaling nearly 18,000 acres of BLM-administered surface in northern Campbell County. The varied topography and diversity of vegetative communities is unique and provides habitat for numerous wildlife species.

Three scenic byways exist in the western part of the planning area. They provide access to the Big Horn Mountains. The Bighorn Scenic Byway is on U.S. Route 14 west of Ranchester. The Cloud Peak Skyway is on U.S. Route 16 west of Buffalo. The Medicine Wheel Passage Scenic Byway is on U.S. Route 14A from Burgess Junction to Lovell.

Recreational use of the planning area is limited because more than 75% of the land surface is privately owned. Developed recreational areas, such as campgrounds, are generally limited to private lands in or near larger communities in the planning area, and to state and federal lands located in the western part of the planning area. However, opportunities for dispersed recreation can be found on federal and state lands throughout the planning area. A few developed recreational sites or facilities exist within BLM-administered lands in the planning area. Communities in the planning area provide a variety of municipal and private recreational facilities, including golf courses, rodeo grounds, parks, and swimming pools.

Major sources of noise are towns; industrial facilities; major roadways, such as I-90; railroad corridors; oil and gas compressor stations; wellhead compressors; generators; and high winds. Noise in rural areas away from industrial facilities and transportation corridors is lower than noise levels close to industrial facilities and transportation corridors. The most substantial noise from CBNG operations results from operation of compressor stations that use multiple engines to move natural gas through high-pressure transmission pipelines.

I.4. Current Status and Habitat Requirements

The USFWS Ecological Service office in Cheyenne, Wyoming, provided a list of Threatened, Endangered, Proposed, and Candidate species that may occur in the planning area. The USFWS letter dated August 26, 2010, contained four species, including blowout penstemon, Greater Sage-Grouse, mountain plover, and Ute ladies'-tresses orchid (USFWS 2010). Black-footed ferret was not identified in the 2010 letter. On May 12, 2011, the USFWS withdrew the proposal to list the mountain plover as Threatened. On June 30, 2011, the BLM BFO requested that blowout penstemon be removed from the field office list as suitable habitat is not present. The USFWS responded to this request with concurrence and removed the blowout penstemon from the BFO list of Threatened and Endangered species for consideration. The remaining two species, included in the USFWS concurrence letter, received by the BLM BFO on July 26, 2011, were Greater Sage-Grouse and Ute ladies'-tresses orchid (Table I.2, "Federally Listed Species in the Buffalo Planning Area" (p. 2033)). No critical habitat is designated for either of these two species within the Buffalo planning area. Greater Sage-Grouse are not included in this BA as it is not presently required to consult or conference on Candidate species. Recently (October 2013), the northern

long-eared bat was proposed for listing as Endangered under the ESA by the USFWS. The species range includes portions of northeast Wyoming; the species has been included in the BA.

Although the black-footed ferret is listed as Endangered in the BFO, it is not being fully analyzed in this BA. On March 6, 2013, the USFWS issued a letter acknowledging 'block clearance' for the State of Wyoming. That letter provided acknowledgement that the likelihood of identifying wild ferrets in Wyoming, outside of those resulting from reintroductions, was distinctly minimal (USFWS 2013b). WY BLM has committed to assist in recovery efforts for the ferret as appropriate (Memorandum of Understanding between WGFD and USFWS, signed November 8, 2013). The BLM manages less than 11% of the surface in the planning area, in primarily small scattered parcels. The WGFD has not proposed reintroduction within the planning area and the BFO does not manage sufficient habitat in the planning area to support a reintroduction. Therefore, management actions implemented in the RMP are anticipated to have no effect on the black-footed ferret.

Table I.2. Federally Listed Species in the Buffalo Planning Area

Common Name	Scientific Name	Status[1]	Expected Occurrence
Ute ladies'-tresses orchid	*Spiranthes diluvialis*	Threatened	Seasonally moist soils and wet meadows of drainages below 7,000 feet above mean sea level.
Northern long-eared bat	*Myotis septentrionalis*	Proposed	Conifer and deciduous forests, caves and mines in north-eastern Campbell County.
Source: USFWS 2010 [1] Status refers to federal status in accordance with the Endangered Species Act.			

Ute Ladies'-Tresses Orchid

Status

On January 17, 1992, the USFWS listed the Ute ladies'-tresses orchid (*Spiranthes diluvialis*) as Threatened in the lower 48 states under the ESA. The Wyoming BLM completed the *Final Statewide Programmatic Biological Assessment Ute Ladies'-Tresses Orchid* in 2007 (BLM 2007). Consideration of effects and conservation measures identified in the statewide assessment are included in this BA. Unless otherwise referenced, the species information in this report came from the statewide BA (BLM 2007).

The Natural Heritage rank is G2 and S1, meaning that the species is imperiled because of rarity on the global level (known from 6 to 20 locations) and critically imperiled because of extreme rarity on the state level (known from 5 or fewer occurrences). The Wyoming Natural Diversity Database (WYNDD) lists the Ute ladies'-tresses orchid as sparse and a High Conservation Priority.

Nine populations of the Ute ladies'-tresses orchid occur in Wyoming within Goshen, Laramie, Converse, and Niobrara counties. Three populations are on BLM-administered surface (Casper Field Office). The populations that are not on BLM-administered surface do not have any federal mineral estate under them.

All BLM Field Office management areas have been inventoried for presence of Ute ladies'-tresses orchid. Ute ladies'-tresses orchid has been found on non-federal surface lands in the Newcastle and Rawlins Field Office areas in addition to the Casper Field Office populations. As further

surveys are conducted, previous and current factors affecting areas with Ute ladies'-tresses orchid will be addressed on a case-by-case basis.

Life History
Ute ladies'-tresses orchid is a perennial plant with stems 8 to 19 inches tall, arising from tuberous-thickened roots. Basal leaves are linear, up to 0.4 inches wide and 11 inches long. Leaves are small in size and number higher up the stem. The species is characterized by a flowering stalk 1.2 to 5.9 inches long with numerous small, ivory white flowers arranged in a helix at the top of the stem. The lip petal is oval to lance-shaped, narrowed at the middle, and has wavy margins. Sepals are separate or fused only at the base and often spread at their tips. In general, Ute ladies'-tresses orchid blooms from late July to early September; however, it does not necessarily flower every year. The peak of flowering occurs in Wyoming around August 10, but it depends on temperature and moisture. It reproduces by seed only.

Habitat Requirements
Ute ladies'-tresses orchid is a species that occurs primarily in seasonally moist peat, sand, silt, or gravel soils near wet meadows, springs, lakes, ponds, or perennial streams. Ute ladies'-tresses orchid establishes in open grass- and forb-dominated riparian areas that are not particularly dense or overgrown. Ute ladies'-tresses orchid seems generally intolerant of shade, although a few populations in eastern Utah and Colorado occur in riparian woodlands. Most populations occur as small, scattered groups occupying relatively small areas within the riparian system. Populations occur in mesic or wet meadows near riparian edges, gravel bars, and old oxbows along perennial streams at elevations ranging from 4,000 to 7,000 feet. Most sites are sub-irrigated and seasonally flooded, remaining moist into the summer.

Ute ladies'-tresses orchid is well-adapted to periodic disturbances from stream movement and grazing. It is known to establish in heavily disturbed sites, such as revegetated gravel pits, heavily grazed riparian edges, and along well-traveled foot trails on old berms.

Regional and Local Distribution
Populations of Ute ladies'-tresses orchid occur in southeastern Wyoming, western Nebraska, north central Colorado, northeastern and southern Utah, east central Idaho, southwestern Montana, and central Washington. Ute ladies'-tresses orchid is currently known from nine sites in eastern Wyoming, including a small population along a tributary to Antelope Creek (a tributary to the Cheyenne River); a population along North Wind Creek, a tributary to Antelope Creek; a population along Stinking Water Creek, a tributary of Sand Creek, which is a tributary to Antelope Creek (all three of these populations are on BLM-administered lands in northwest Converse County (Casper Field Office); one population along Bear Creek in southwestern Goshen County (Casper Field Office) and a second population along Bear Creek in north-central Laramie County (Rawlins Field Office) (both of these populations are on state lands); a large population along the Niobrara River near McMaster's Reservoir in southeastern Niobrara County (Newcastle Field Office) on private land; and two populations along Sprager Creek in Laramie County (Rawlins Field Office) on private lands. Another population occurs on private lands in the Horse Creek watershed in Laramie County (Rawlins Field Office). These populations were all discovered between 1993 and 2005. They are monitored on a limited basis and appear to be stable. Mowing occurs on at least four of the sites and grazing occurs on all of the sites and appears to have only minor impacts on the populations. In fact, the combination of mowing and grazing appears to benefit Ute ladies'-tresses orchid on the private parcels. The Wyoming Natural Diversity Database (WYNDD) predicts that within the planning area the Ute ladies'-tresses orchid would

most likely occur in southwestern Campbell County (Figure I.1, "Wyoming Natural Diversity Database Predicted Ute Ladies-Tresses Orchid Distribution in Wyoming." (p. 2035)).

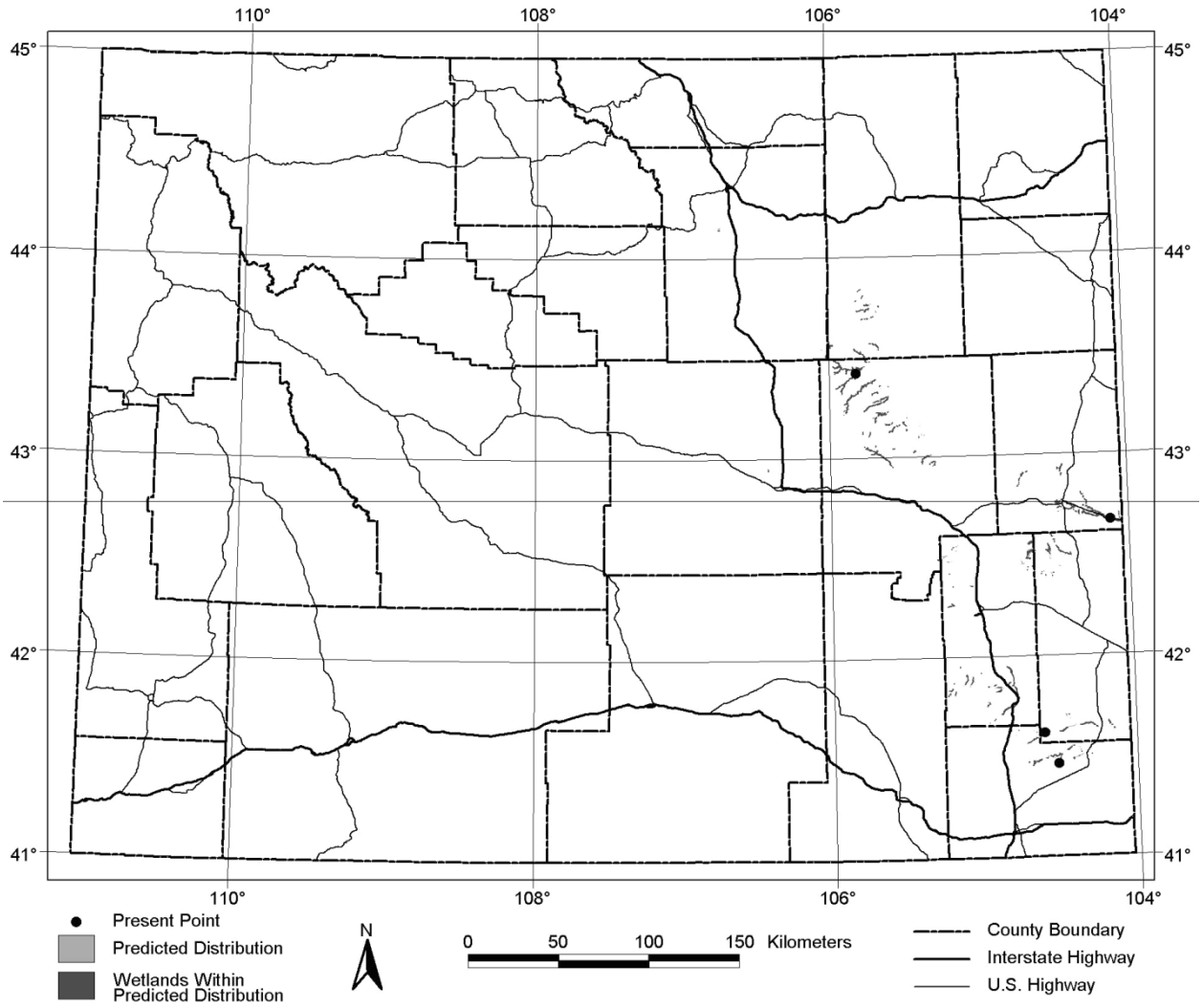

Figure I.1. Wyoming Natural Diversity Database Predicted Ute Ladies-Tresses Orchid Distribution in Wyoming.

Because it may not flower or emerge every year, there may be unknown populations. The total number of individuals from known populations in the state is estimated to be approximately 3,000 to 4,000 plants in a total area of about 50 acres, although the population numbers may fluctuate from year to year. Populations range in size from small patches of 12 to 35 individuals to the largest population of 1,000 to 2,000 plants.

Threats

Ute ladies'-tresses orchids, in general, are not common. They are rare in their distribution. This makes it difficult to assess the stability of any given population. Furthermore, the naturally occurring low population numbers make the species susceptible to localized extinction caused by natural or man-made disasters. Historical accounts typically help realize the population trends, but populations in Wyoming were not discovered until 1993. Although no trend data are available, populations in Wyoming are considered stable. Continued presence/absence

surveys and population studies will provide data necessary to quantify statewide trends in distribution and populations.

Changes in large ungulate populations may have affected the distribution of Ute ladies'-tresses orchid. This species likely evolved according to the seasonal presence of large herbivores such as American bison, elk, deer, and bighorn sheep. Changes in these species' distribution could have adversely affected Ute ladies'-tresses orchid populations by removing them during late winter and early spring. Additionally, cattle grazing may alter both plant communities and stream ecology. Depending when a site is grazed, there is also the possibility of removing flowering or fruiting stalks. With cattle introduction, there is the risk of noxious weed invasion. Canada thistle, reed canary grass, and leafy spurge pose threats because they compete vigorously with Ute ladies'-tresses orchid.

Herbicides applied to control noxious weeds and fertilizers from agricultural fields possibly affect Ute ladies'-tresses orchid. Both direct applications to nearby agricultural fields and runoff from sites upstream have potentially harmful effects on Ute ladies'-tresses orchid. Pesticides applied to nearby sites could affect bumblebee populations, which are the Ute ladies'-tresses orchid primary pollinators.

Development in or near wetlands has had an effect on the distribution of Ute ladies'-tresses orchid. Water diversion, channelization, and irrigation have all affected the species. All of these factors decrease the input of water into riparian systems or completely destroy habitat, thus eliminating potential habitat for this species. Conversely, some irrigated plots have proven to create habitat for Ute ladies'-tresses orchid.

Northern Long-eared Bat

Status

On October 2, 2013, the USFWS proposed the northern long-eared bat (*Myotis septentrionalis*) for listing as Endangered under the ESA (USFWS 2013a). Unless otherwise referenced, the species information in this BA came from the Proposed Rule in the FR notice (USFWS 2013a). It was determined that the northern long-eared bat is in danger of extinction, predominantly due to the threat of white-nose syndrome (WNS). However, other threats (the present or threatened destruction, modification, or curtailment of its habitat or range; overutilization for commercial, recreational, scientific, or educational purposes; other natural or manmade factors affecting its continued existence) when combined with WNS heighten the level of risk to the species.

NatureServe gives this species a global conservation rank G2/G3, meaning that the species is imperiled, with a high to moderate risk of extinction or elimination due to restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors (NatureServe 2013).

Most BLM field offices have not inventoried for presence of northern long-eared bat. Surveys conducted by the USFS in 2006 positively identified the presence of the species near Spring Creek in northern Campbell County; no other observations have been reported in the Buffalo planning area (Schubert 2013). As further surveys are conducted, previous and current factors affecting areas with northern long-eared bat will be addressed on a case-by-case basis.

Life History

A medium-sized bat species, the northern long-eared bat adult body weight averages 5 to 8 g,

with females tending to be slightly larger than males. Fur is medium to dark brown on its back, dark brown, but not black, ears and wing membranes, and tawny to pale-brown fur on the ventral side. The northern long-eared bat is distinguished from other *Myotis* species by its long ears (average 17 mm (0.7 in)) that, when laid forward, extend beyond the nose but less than 5 mm (0.2 in) beyond the muzzle. The tragus is long, pointed, and symmetrical. Within its range, the northern long-eared bat can be confused with the little brown bat (*Myotis lucifugus*) or the western long-eared myotis (*Myotis evotis*).

Northern long-eared bats hibernate during the winter months to conserve energy from increased thermoregulatory demands and reduced food resources. In general, northern long-eared bats arrive at hibernacula in August or September, enter hibernation in October and November, and leave the hibernacula in March or April. In the Black Hills northern long-eared bats typically enter hibernacula by October 1 and depart before May 15 (Reeves pers. comm.). Northern long-eared bats have shown a high degree of philopatry (using the same site multiple years) for a hibernaculum, although they may not return to the same hibernaculum in successive seasons. Typically, northern long-eared bats are not abundant and compose a small proportion of the total number of bats hibernating in a hibernaculum. Although usually found in small numbers, the species typically inhabits the same hibernacula with large numbers of other bat species, and occasionally are found in clusters with these other bat species. Other species that commonly occupy the same habitat include: little brown bat, big brown bat, eastern small-footed bat, tri-colored bat, and Indiana bat. Northern long-eared bats exhibit significant weight loss during hibernation. The northern long-eared bat is not considered a long-distance migratory species; short migratory movements between summer roost and winter hibernacula have been documented. Movements from hibernacula to summer colonies may be further. Several studies show a strong homing ability of northern long-eared bats in terms of return rates to a specific hibernaculum, although bats may not return to the same hibernaculum in successive winters.

Breeding occurs from late July in northern regions to early October in southern regions and commences when males begin to swarm hibernacula and initiate copulation activity. Hibernating females store sperm until spring, exhibiting a delayed fertilization strategy. Ovulation takes place at the time of emergence from the hibernaculum, followed by fertilization of a single egg, resulting in a single embryo; gestation is approximately 60 days. Maternity colonies, consisting of females and young, are generally small, numbering from about 30 to 60 individuals. Adult females give birth to a single pup typically in late May or early June, but may occur as late as July. Juveniles typically start flying at 21 days. Adult longevity is estimated to be up to 18.5 years.

The northern long-eared bat has a diverse diet including moths, flies, leafhoppers, caddisflies, and beetles, with diet composition differing geographically and seasonally. Foraging techniques include hawking (catching insects in flight) and gleaning in conjunction with passive acoustic cues. Emerging at dusk, most hunting occurs above the understory, but under the canopy on forested hillsides and ridges, rather than along riparian areas. This coincides with data indicating that mature forests are an important habitat type for foraging.

Habitat Requirements

Northern long-eared bats forage primarily in coniferous or deciduous forests. They are short-distance migrants, the distance between summer habitat and the hibernaculum typically being 56 kilometers (35 miles) (Hester and Grenier 2005) to 89 kilometers (55 miles) (USFWS 2014) or less. Northern long-eared bats predominantly overwinter in hibernacula that include caves and abandoned mines. Hibernacula used by northern long-eared bats are typically large, with large passages and entrances, relatively constant, cooler temperatures, and with high

humidity and no air currents. They are typically found roosting in small crevices or cracks in cave or mine walls or ceilings, often with only the nose and ears visible, thus are easily overlooked during surveys. To a lesser extent, northern long-eared bats have been found overwintering in other types of habitat including abandoned railroad tunnels, more frequently in the northeast portion of the range.

During the summer, northern long-eared bats typically roost singly or in colonies underneath bark or in cavities or crevices of both live trees and snags. Males and non-reproductive females' summer roost sites may also include cooler locations, including caves and mines. Northern long-eared bats have also been observed roosting in colonies in human made structures, such as buildings, barns, park pavilions, sheds, cabins, under eaves of buildings, behind window shutters, and in bat houses. Northern long-eared bats most likely are not dependent on a certain species of trees for roosts throughout their range; rather, certain tree species will form suitable cavities or retain bark and the bats will use them opportunistically. Structural complexity of habitat or available roosting resources may be more important factors. The species appears to favor areas with greater canopy cover, and often roosts below the canopy, but higher on slopes. Northern long-eared bats switch roosts often, typically every 2-3 days. Bats switch roosts for a variety of reasons, including, temperature, precipitation, predation, parasitism, and ephemeral roost sites.

Regional and Local Distribution

The northern long-eared bat ranges across much of the eastern and north central U.S., and all Canadian provinces west to the southern Yukon Territory and eastern British Columbia. In the U.S., the species' range reaches from Maine west to Montana, south to eastern Kansas, eastern Oklahoma, Arkansas, and east to the Florida panhandle. Throughout the majority of the species' range it is patchily distributed, and historically was less common in the southern and western portions of the range than in the northern portion of the range. Although they are typically found in low numbers in inconspicuous roosts, most records of northern long-eared bats are from winter hibernacula surveys. Wyoming has no known hibernacula (likely due to lack of survey effort, suitability of habitat, and extent of range) (Hester and Grenier 2005).

The U.S. portion of the northern long-eared bat's range can be described in four parts: the eastern population, Midwestern population, the southern population, and the western population. Historically, the northern long-eared bat was most abundant in the eastern portion of its range. The northern long-eared bat is generally less common in the western portion of its range; it is considered common in only small portions of the western range (e.g., Black Hills) and uncommon or rare in the western extremes of the range (e.g., Wyoming, Kansas, Nebraska). The northern long-eared bat is considered abundant in the Black Hills having been observed hibernating and during the summer.

There are no limestone, dolomite or other karst formations suitable for caves within the Buffalo planning area east of the Big Horn Mountains. There are also no known abandoned mine shafts with hibernacula potential. The closest potential hibernacula habitat is the western extent of the Black Hills in Crook County, within ten miles of the Campbell County line.

During acoustic and mist net surveys conducted throughout Wyoming in the summers of 2008-2011, 27 separate observations of northern long-eared bats were recorded in Weston and Crook counties and breeding was confirmed by the WGFD (USFWS 2013a; WGFD 2011). To date, the BLM only knows of one survey where northern long-eared bats were captured by mist nets and acoustic monitors in the Buffalo planning area. In July 2006, the USFS conducted surveys near Spring Creek in northern Campbell County on USFS lands. Several calls were

recorded, and one individual was captured (Schubert 2013). Though additional surveys are planned, BLM is not aware of any extensive survey efforts in Campbell County that may be used to differentiate occupied versus unoccupied habitats. However, suitable habitats are known to be extremely limited in the planning area, with forested habitats comprising approximately 4% of the Campbell County land base. Even more limited is the overlap of forested habitats with either BLM administered surface or minerals, comprising around 75,000 acres, or 2.4% of the total land base in the county. Forested habitat in Campbell county rarely occurs as large, contiguous stands, but more often as small stands restricted to steep slopes and ridges. WYNDD predicts that within the planning area the northern long-eared bat would occur only in northeastern Campbell County (Figure I.2, "Wyoming Natural Diversity Database Predicted Northern-Long Eared Bat Distribution in Wyoming." (p. 2039)).

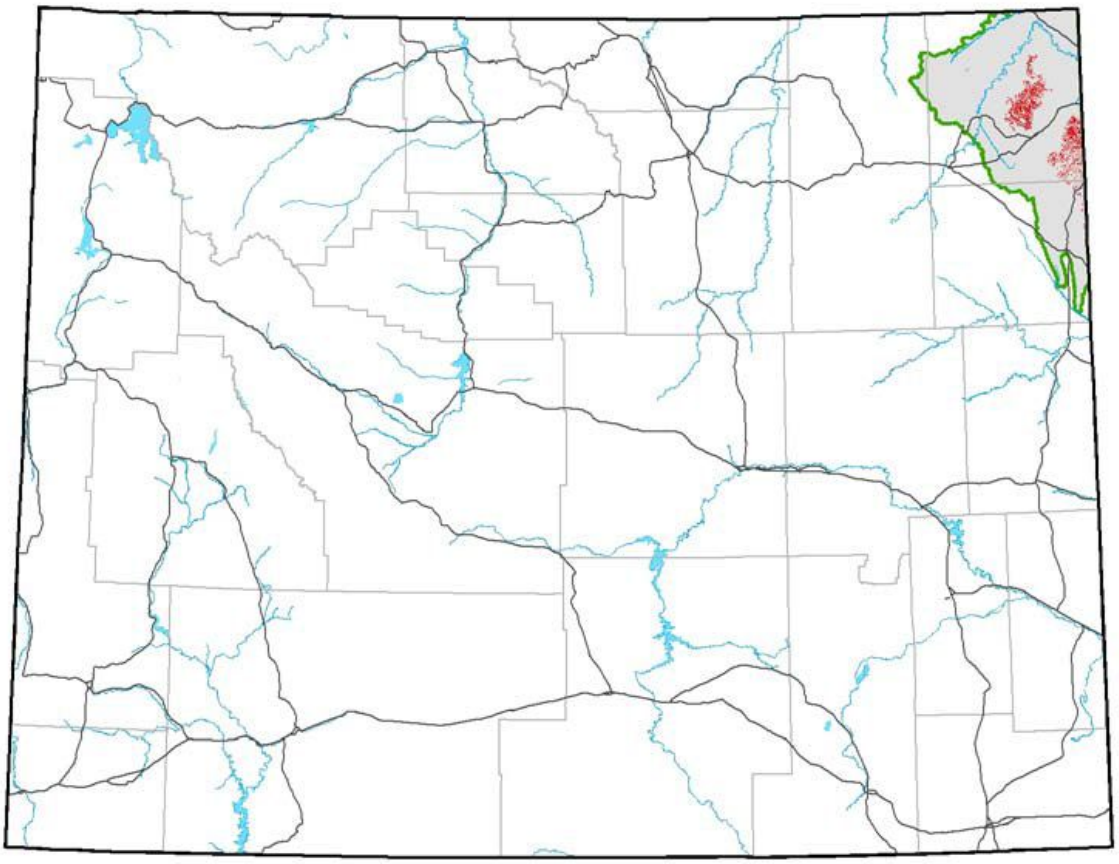

Figure I.2. Wyoming Natural Diversity Database Predicted Northern-Long Eared Bat Distribution in Wyoming.

Threats

It was determined that the northern long-eared bat is in danger of extinction, predominantly due to the threat of WNS. WNS is a disease caused by the cold-loving fungus, *Psuedogymnoascus* (*Geomyces*) *destructans*. First observed in New York in 2006, WNS has spread rapidly across the Northeast and into the Midwest and Southeast. Throughout the range of WNS, up to 99 percent of infected bats die from the disease. Although there is uncertainty about the spread of WNS, experts agree that the fungus will likely spread throughout the United States (USFWS 2013b).

The northern long-eared bat is also threatened by the loss and degradation of summer habitat caused by human development, and by collision with or barotrauma (injury to the lungs due to a change in air pressure) caused by wind turbines. Mine closures and vandalism of winter roosts and hibernacula also pose threats to this species (USFWS 2013b). These additional threats (the present or threatened destruction, modification, or curtailment of its habitat or range; overutilization for commercial, recreational, scientific, or educational purposes; other natural or manmade factors affecting its continued existence) when combined with WNS heighten the level of risk to the species (USFWS 2013a).

I.5. Methods and Context of the Analysis

The Proposed RMP was reviewed to identify foreseeable actions with the potential to affect listed and proposed species in the planning area. The BLM, the USFWS, the WYNDD, the WGFD, and private consultants have performed ground surveys and inventories as part of other planning documents or projects. Moreover, species recovery plans, action plans, critical habitat designation documents, and conservation plans were reviewed for further information on habitats, occurrences, life histories, and conservation measures.

Activity Description

For brevity purposes, descriptions of the individual resource programs/activities are not presented in the BA. BLM Wyoming's Ute ladies'-tresses orchid programmatic BA (BLM 2007p) provides summary descriptions of BLM's resource programs. Additional detail, specific to the Buffalo planning area is presented within the Proposed RMP. Goals, objectives and management actions for each resource activity are identified in the detailed alternative description tables (Section 2.9). The BA reiterates those management actions expected to have a direct conservation benefit for Threatened, Endangered, and Proposed species. The Affected Environment section (Chapter 3) describes the regional context, current conditions within the planning area (including past effects) and trends for each resource activity. The Environmental Consequences section (Chapter 4) analyzes the direct, indirect, and cumulative effects of the various resource activities upon the specific resource activity. The impacts common to all describes the general effects of each resource activity while Alternative D (proposed alternative) describes the additional effects (effects in addition to the common to all alternative effects) of the proposed alternative. Several of the appendices also provide helpful resource program information: Appendix E lists the livestock allotments including federal acreage and permitted AUMs, Appendix G identifies the forecasted level of development for each resource activity, Appendix N describes the air quality management program (technical data is provided in Appendix M), Appendix R describes the travel management program, Appendix S describes management for the proposed ACECs, Appendix T describes management for the proposed Special Recreation Management Areas, Appendix V describes the fluid mineral management process, and Appendix W describes water management.

Effects Analysis

This BA analyzes the effects of a proposed *federal action*, the Proposed RMP. A *federal action* is defined as anything authorized, funded, or carried out by the federal agency. *Direct impacts* are effects on the species or its habitats caused by an action and occur at the same time and place as the action. *Indirect impacts* are effects on the species or its habitat caused by an action occurring later in time or farther removed in distance than direct impacts, but which are still reasonably

foreseeable. The analysis of all impacts includes the effects of interrelated and interdependent actions.

For the purposes of effects analysis under the ESA, *cumulative effects* are defined as impacts of future state, tribal, and private actions reasonably certain to occur. Future federal actions will be subject to the consultation requirements established in ESA Section 7 and, therefore, are *not* considered cumulative to the proposed action.

Factors considered when analyzing effects of federal actions include proximity of the action to the species or habitat of concern, geographic distribution of the action disturbance, timing of the action, nature of the action effect, action disturbance frequency, duration of the affecting action, action disturbance intensity, and action disturbance severity.

The BA process is focused primarily on *adverse impacts* to the species of concern. Although impacts to the subject species may be beneficial, the effects determination of the assessment is based on and controlled by the likelihood of adversely affecting the species. In other words, for a BA, the impacts analysis is not an averaging process.

Effects Determinations

Determinations for each resource program (i.e., air quality, cultural resources, livestock grazing management, etc.) are based on the impacts of the management actions (proposed protections) and conservation measures committed to by the BLM. BMPs are typically voluntary measures; therefore, they are speculative and not typically considered in the effects determination. However, the BLM is committed to implementing BMPs identified in the BLM National Greater Sage-Grouse Land Use Planning Strategy (BLM Instruction Memorandum [IM] 2012-044) and the BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA as required design features (RDFs). The BLM will require application of all appropriate RDFs, warranted by site-specific analysis, in order to avoid, minimize, rectify, reduce, or compensate for impacts. RDFs not included in project proposals and determined appropriate from the site-specific analysis will be required as Conditions of Approval (COAs). RDFs are listed as conservation measures as BLM is committed to their implementation.

Threatened and Endangered Species Determinations - Determination categories for this BA for federally listed Threatened and Endangered species are defined below.

No effect (NE) – The appropriate conclusion when the BLM determines its proposed action will not affect listed species or critical habitats. The principle factors for this determination are that "suitable habitat" or the species does not exist in the analysis area, or the very nature of the action will not have any effect on an individual or its habitat. In this situation, no further contact with the USFWS is required.

May affect, not likely to adversely affect (NLAA-b, -i, -d) – The appropriate conclusion when effects on a listed species or its critical habitats are expected to be completely beneficial (-b), or insignificant (-i), or discountable (-d). Beneficial effects have contemporaneous beneficial effects without adverse effects to the species or its critical habitat. (For example, there cannot be "balancing," where the benefits of the action would outweigh the adverse effects.) Insignificant effects relate to the size of the impact and should not reach the scale where take occurs. Discountable effects are extremely unlikely to occur. Based on best judgment, a person would not be able to meaningfully measure, detect, or evaluate insignificant effects, or expect discountable

effects (USFWS and U.S. National Marine Fisheries Service 1998). This level of effect requires informal Section 7 consultation with the USFWS and their concurrence with the determination.

May affect, is likely to adversely affect (LAA) – The appropriate conclusion if any adverse effect to the listed species or its critical habitats may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not discountable, insignificant, or beneficial. In the event the overall effect of the proposed action is beneficial to the listed species, but also is likely to cause some adverse effects to even just one individual plant or animal, then the proper effect determination for the proposed action "is likely to adversely affect" the listed species. An "is likely to adversely affect" determination requires formal Section 7 consultation with the USFWS.

There is no designated critical habitat in the Buffalo planning area.

Proposed Species - The ESA Section 7 consultation process is not required for Proposed species, unless it has been determined that actions taken are likely to jeopardize the continued existence of the species. However, because the northern long-eared bat has been identified as a Proposed species, it may eventually become listed, and there are advantages to addressing Proposed species as though they were listed. Early technical coordination with the USFWS can yield some collaborative management advantages and is in line with BLM Manual 6840. For these reasons, the northern long-eared bat is included in this BA and will be analyzed as appropriate. Determination categories used in this BA for federal Proposed species are defined below. For the purposes of requesting technical assistance from the USFWS for the proposed action, the following language for Proposed species effects determinations will apply:

No Effect (NE) – The appropriate conclusion when the BLM determines its proposed action will not impact Proposed species or their essential habitat. This is based on the fact that the species' habitat is not present and/or no impacts would be expected to occur. If this determination is reached, no coordination with the USFWS regarding the proposed species would be necessary.

May affect, not likely to adversely affect (NLAA) – The appropriate conclusion when the BLM identifies situations in which the proposed action may have an impact on individuals but any impacts are likely to be wholly beneficial, so unlikely as to be considered totally discountable, or so small or minor as to be considered completely insignificant. Where this determination is made, the BLM will not likely pursue formal conference with the USFWS because there is no potential for NLAA to rise to the level of jeopardy of the continued existence of the Proposed species at either local or range-wide scales. If this conclusion is reached, BLM determinations will be coordinated with the USFWS as appropriate.

May impact, likely to adversely affect (LAA) – The appropriate conclusion when the BLM identifies situations in which the proposed action is likely to have an adverse impact on individuals or populations of the Proposed species. Determinations of jeopardy will be the subject of formal conference request with the USFWS.

BLM staff reviewed proposed management actions associated with the Proposed RMP and potential impacts to individual species to identify potential impact to the species if the actions were to occur within suitable habitat for the species.

This BA describes, in detail, potential actions that may affect listed or proposed species. Other potential actions that have been determined to have no effect on a species are not discussed in

detail. Programs that do not have actions located within the habitat of a listed species have been identified as having no effect on that species.

Coordination and Conservation Measures

Consistent with Section 7 of the ESA, the BLM considered conservation measures for the management of Threatened, Endangered and Proposed species. The adopted conservation measures for Utes Ladies'-tresses Orchid and Northern Long-eared Bat will be incorporated into the approved RMP. Conservation measures serve several purposes, including presenting ways the BLM can assist species conservation in furtherance of statutory responsibilities; minimizing or avoiding the adverse impacts of a proposed action on Threatened, Endangered or Proposed species; and identifying and recommending studies aimed at improving the understanding of a species' biology or ecology.

Management is addressed in four primary ways, as follows:

- Through conservation measures, reasonable and prudent measures, and BMPs identified as part of a species listing package, measures recommended in the BO from the USFWS in response to a BA, and through species protection measures determined through collaborative interagency and multidiscipline efforts.

- The BLM Wyoming Field Offices incorporate the *Wyoming BLM Mitigation Guidelines for Surface-Disturbing and Disruptive Activities*. These guidelines state that before performing activities in known or suspected habitats, the lessee or permittee is required to perform inventories or studies in accordance with BLM and/or USFWS guidelines to verify the presence or absence of federally-listed Threatened and Endangered species. If the presence of one or more of these species is verified, the operation plans of a proposed action will be modified to include the protection of the species and its habitat, as necessary. Possible protective measures include seasonal or activity limitations, or other surface management and occupancy constraints.

- The BLM incorporates *Wyoming Standards for Healthy Rangelands* (BLM 1997). As stated, the "standards apply to all resource uses on public lands," while the "guidelines apply specifically to livestock grazing management practices on BLM-administered public lands" [surface]. The development and application of these standards and guidelines are intended to achieve the following four fundamentals of rangeland health: (1) proper functioning of air and watersheds; (2) proper cycling of air, water, soil nutrients, and energy; (3) attainment of state water quality standards; and (4) sustained maintenance and management of the native fauna and flora of the area, including federally listed Threatened and Endangered species. These fundamental goals are achieved through inventory of natural resources, appropriate management actions aimed at these resources, monitoring and evaluation of the effectiveness of these management actions, and land management adjustments as necessary.

- *BLM Manual 6840: Special Status Species Management* directs Field Office managers to implement special status species programs within their area of jurisdiction by: (1) implementing conservation strategies for BLM special status species as contained in approved recovery plans, cooperative agreements, and other instruments the BLM has cooperatively participated in the development of; (2) conducting and maintaining current inventories of BLM special status species on BLM-administered lands; (3) ensuring that all actions undertaken comply with the ESA, its implementing regulations, and other directives associated with ESA-listed

and proposed species; (4) ensuring that the results of formal Section 7 consultations, including mandatory terms and conditions in incidental take statement that are consistent with 50 CFR 402 regulations, are implemented and documented in the administrative record; (5) coordinating field office activities with federal, state, and local groups to ensure the most effective program for BLM special status species; (6) ensuring that land use and implementation plans fully address appropriate conservation of BLM special status species; and (7) monitoring populations of BLM special status species to determine whether management objectives are being met. Records of monitoring activities are to be maintained and used to evaluate progress relative to such objectives. Monitoring shall be conducted consistent with the principles of adaptive management as defined in the U.S. Department of the Interior (DOI) policy, as appropriate.

The conservation measures are intended to minimize adverse impacts likely to result from implementation of the management actions in the Proposed RMP. Conservation measures presented take two forms, as follows: the proposed management actions within the Proposed RMP (Proposed Protections) and additional conservation measures from BLM policies, conservation strategies, BAs and similar sources that would reduce impacts to listed or proposed species. Program appropriate BMPs that would further protect the species and its habitats are also included to be applied to individual projects, as warranted. If new populations of the species are discovered, these measures would apply until such time that further investigation and subsequent consultation with the USFWS results in more appropriate management prescriptions.

Conservation measures have been written in a format that will allow for either their direct use as stipulations or operating standards and/or in addition to specific or specialized mitigation following the submission of a detailed development plan or other project proposal and an environmental analysis. These operating standards are given as acceptable methods for mitigating anticipated effects and achieving the desired plan outcomes but are not prescribed as the only method for achieving the outcomes.

Those resource activities or programs currently without a standardized set of permit or operation stipulations can use the conservation measures as stipulations or as COAs, or as a baseline for developing specific stipulations for a given activity or program.

Conservation Measures Common to All Species

The following general conservation measures will be applied under all resource programs and are not repeated in this BA under each management program. The Statewide Programmatic BAs and BOs, including all reasonable and prudent measures and terms and conditions, will be implemented for the Buffalo planning area. Conservation measures are identified with the appropriate resource.

- Surface-disturbing activities are subject to the *Wyoming BLM Mitigation Guidelines for Surface-Disturbing and Disruptive Activities,* the *Wyoming BLM Reclamation Policy* issued under IM WY-2012-032, and similar guidance and policy as updated over time (BLM 2012a). The *Wyoming BLM Mitigation Guidelines for Surface-Disturbing Activities* requires any lessee or permittee to perform inventories or studies in accordance with BLM and USFWS guidelines to verify the presence or absence of Threatened or Endangered species before any activities can begin onsite. In the event the presence of one or more of these species is verified, the operation plans of a proposed action will be modified to include the protection of the species and its habitat, as necessary. Possible protective measures may include seasonal or activity limitations or other surface management and occupancy constraints.

- The BLM may pursue a withdrawal from appropriation under the mining laws for special status species habitat on a case-by-case basis.

- The BLM will modify projects that may affect special status species to protect these species and will consult with the USFWS in such cases, as required by the ESA.

- The BLM will consult with stakeholders in modifying projects that may affect special status species.

- The BLM will assist authorized agencies in the restoration, reintroduction, augmentation, or reestablishment of Threatened, Endangered, and other special status species populations and/or habitats.

- Motorized vehicle use is limited to designated roads and trails in essential and recovery habitat for Threatened or Endangered species.

- All types of forest management will apply appropriate mitigation, that riparian/wetland areas will be managed to meet Proper Functioning Condition (PFC) and the *Wyoming Standards for Healthy Rangelands*, and the BLM will work cooperatively to control outbreaks of grasshoppers and Mormon crickets.

- Areas harvested for timber are to be regenerated by natural or artificial means consistent with BLM policy, and vegetative communities are managed in accordance with the *Wyoming Standards for Healthy Rangelands*.

- Grazing management will consider Threatened and Endangered species and their habitats. Grazing management practices will incorporate the kinds and amounts of use that will restore, maintain, or enhance habitats to assist in the recovery of federally Threatened and Endangered species or the conservation of federally listed species of concern and other state-designated special status species. Grazing management practices will maintain existing habitats or facilitate vegetation change toward desired habitats by considering the hydrology, physical attributes, and potential for the watershed and the ecological site (BLM 1997).

- Management prescriptions for invasive species include developing and maintaining an invasive species and pest management plan, and coordinating with appropriate stakeholders to manage for the reduction of cheatgrass and other invasive species.

- Fish and wildlife management includes actions to appropriately mitigate the effects of surface-disturbing activities. Management actions include maintaining or improving important wildlife habitats through vegetative manipulations, habitat improvement projects, livestock grazing strategies, and the application of applicable guidance.

- The BLM will continue to use and update existing Habitat Management Plans (HMPs) (including the South Big Horns HMP, Wetlands HMP, and Middle Fork Powder River HMP) as necessary to include management objectives and prescriptions for wildlife.

- The BLM will participate with the development of species specific recovery plans in coordination with the USFWS and other agencies. Populations and habitats on BLM-administered lands will be monitored to determine if recovery objectives are being met.

- In the event a dead or injured Threatened or Endangered species is discovered during project activities the BLM would notify the USFWS Ecological Field Office (307-772-2374) or Law Enforcement Office (307-261-6365) within 24 hours of the discovery.
- BLM-administered public lands that contain identified habitat for Threatened and Endangered Species will not be exchanged or sold, unless it benefits the species.

I.6. Analysis of Proposed Management Actions and Effects

The following program analyses follow a linear process that starts with the resource activity description and runs through to a listing of effect determinations. For purposes of this BA, this section is divided into a discussion of each major functional resource activity occurring on the public lands in the planning area. For each major activity, conservation strategies are divided into two categories, as follows: proposed protections identified for the Agency Proposed Alternative and Conservation Measures. The proposed protections identified in the Proposed RMP are those protections for the specific resource that will benefit Threatened, Endangered, or Proposed species. The conservation measures include additional management actions within the Proposed RMP (additional to those for the resource being discussed), policy measures, and other conservation measures that could further protect Threatened, Endangered or Proposed species. This information provides the basis for the impacts analysis and effect determinations presented by species and their respective habitats, and the potential direct, indirect, and cumulative effects of the activity.

Note: measures may be paraphrased within this section. For the complete wording of the Proposed RMP's Management Actions see the *Detailed Alternative Descriptions* (Section 2.7) of the proposed RMP. The complete wording of conservation measures from other sources is identified in Section 10 of this BA. The complete text, not the paraphrased wording presented here, was used in the impact analysis and effects determinations.

Proposed RMP Management Actions Applicable to all Resource Activities

The analysis for each resource program begins by listing the conservation measures applicable to that resource activity. Since many conservation measures will be applied to all resource programs they are listed within this section and are not repeated within the individual resource program analyses to reduce redundancy. The complete list of conservation measures is also included in Section 10.

Ute Ladies'-Tresses Orchid

- Implement actions set forth in recovery plans, conservation measures, terms and conditions, and appropriate BMPs and reasonable and prudent measures within BOs for Threatened and/or Endangered plant species. (SS Plants-4001)
- Allow treatments within habitat for special status plant species and within known populations that are proven to benefit the species. (SS Plants-4002)
- Allow the following within habitat for special status plant species, though not within known populations: surface-disturbing activities that could adversely impact special status plant species, mineral exploration and development activities, motor vehicle use, including uses related to fire suppression and geophysical exploration activities (surveying, etc.), use of

explosives and blasting, and placement of water developments, salt and mineral supplements. (SS Plants-4003)

- Require predisturbance flowering season surveys for special status plant species prior to approving any project or activity that may impact the habitat for these species as modeled and surveyed by WYNDD and BLM. A mitigation and monitoring plan is to be developed within occupied habitat. (SS Plants-4004)
- Prohibit new surface-disturbing activities within 0.25 mile of any waters containing special status fish species unless it benefits the species. Exceptions must demonstrate the proposed impacts cannot be avoided and the proposal is the least environmentally damaging alternative. (SS Fish-4007)
- Utilize current research, management and conservation plans, and similar related documents to guide special status species habitat management. (SS WL-4001)
- Implement actions set forth in recovery plans, conservation measures, terms and conditions, protection measures, and appropriate BMPs and reasonable and prudent measures within BOs for Threatened and/or Endangered wildlife species, including those specific to this RMP and any future statewide programmatic BOs. (SS WL-4002)
- Maintain (size and quality) or enhance current habitat utilized by special status species. Enlarge/restore habitat on site specific basis. (SS WL-4003)
- Maintain or enhance the integrity of identified special status wildlife species migration corridors. Manage identified special status wildlife species travel corridors consistent with other resource values. (SS WL-4004)
- Manage surface-disturbing and disruptive activities to mitigate impacts on special status wildlife species and their habitats. (SS WL-4006)
- Apply a CSU stipulation to mineral leases containing special status species habitat. Surveys required for clearance. (SS WL-4007)
- Restore Greater Sage-Grouse brood-rearing habitats in riparian/wetland areas. Maintain seeps, springs, wet meadows, and riparian vegetation in a functional and diverse condition for young Greater Sage-Grouse and other species that depend on forbs and insects associated with these areas. (SS WL-4012)

Northern Long-Eared Bat

- Manage human activity in caves with significant resources by developing and implementing a Cave Management Plan for the planning area, with potential cave specific components. (Cave-1003)
- Require a site-specific buffer from significant cave entrances for surface-disturbing activities. (Cave-1005)
- Utilize current research, management and conservation plans, and similar related documents to guide special status species habitat management. (SS WL-4001)
- Implement actions set forth in recovery plans, conservation measures, terms and conditions, protection measures, and appropriate BMPs and reasonable and prudent measures within BOs

for Threatened and/or Endangered wildlife species, including those specific to this RMP and any future statewide programmatic BOs. (SS WL-4002)

- Maintain (size and quality) or enhance current habitat utilized by special status species. Enlarge/restore habitat on site specific basis. (SS WL-4003)
- Maintain or enhance the integrity of identified special status wildlife species migration corridors. Manage identified special status wildlife species travel corridors consistent with other resource values. (SS WL-4004)
- Manage surface-disturbing and disruptive activities to mitigate impacts on special status wildlife species and their habitats. (SS WL-4006)
- Apply a CSU stipulation to fluid mineral leases containing special status species habitat. Surveys required for clearance. (SS WL-4007)
- Require surveys for special status amphibian, reptile, and bat species prior to approving any project or activity that may impact the habitat for these species. Habitat includes: caves, mature forest, perennial waters, vernal pools, playas, wetlands, and south-facing rock outcrops. Allow surface-disturbing and disruptive activities within 1,640 feet (500 meters) of caves, mature forest, perennial waters, vernal pools, playas, wetlands, and south facing rock outcrops when special status amphibian, reptile, and bat species populations and habitat can be conserved. (SS WL-4033)

Conservation Measures Applicable to all Resource Activities

BLM Wyoming Statewide Programmatic BA for Ute Ladies'-Tresses Orchid Conservation Measures

- The *Wyoming BLM Standard Mitigation Guidelines for Surface Disturbing Activities* requires any lessee or permittee to conduct inventories or studies in accordance with the BLM and USFWS guidelines to verify the presence or absence of threatened or endangered species before any activities can begin on site. In the event the presence of one or more of these species is verified, the operation plans of a proposed action will be modified to include the protection of the species and its habitat, as necessary. Possible protective measures may include seasonal or activity limitations, or other surface management and occupancy constraints.
    - Surface disturbance will be prohibited within 500 feet of surface water and/or riparian areas. Exception, waiver, or modification of this limitation may be approved in writing, including documented supporting analysis, by the authorized officer. (Wyoming BLM Mitigation Guidelines for Surface-disturbing and Disruptive Activities). **Note**: this conservation measure was revised from the programmatic BA by adding the second sentence to clarify that exception, waiver, or modifications from the prohibition are possible.
    - NSO will be allowed within special management areas (e.g., known threatened or endangered species habitat) (Wyoming BLM Mitigation Guidelines for Surface-disturbing and Disruptive Activities).
    - Portions of the authorized use area are known or suspected to be essential habitat for threatened or endangered species. Prior to conducting any onsite activities, the lessee/permittee will be required to conduct inventories or studies in accordance with BLM

and USFWS guidelines to verify the presence or absence of this species. In the event that an occurrence is identified, the lessee/permittee will be required to modify operational plans to include the protection requirements of this species and its habitat (e.g., seasonal use restrictions, occupancy limitations, facility design modifications) (Wyoming BLM Mitigation Guidelines for Surface-disturbing and Disruptive Activities).

- Within the potential of the ecological site (soil type, landform, climate, and geology), the BLM will ensure that the soils are stable and allow for water infiltration to provide for optimal plant growth and minimal surface runoff.

- The BLM will maintain biological diversity of plant and animal species; support the WGFD strategic plan population objective levels to the extent practical and to the extent consistent with BLM multiple use management requirements; maintain, and where possible, improve forage production and quality of rangelands, fisheries, and wildlife habitat; and to the extent possible, provide habitat for threatened and endangered and special status plant and animal species on all public lands in compliance with the ESA and approved recovery plans.

- If revegetation projects are conducted within 0.25 miles of known habitat for the orchid, only native species will be selected. This conservation measure will keep non-native species from competing with the orchid.

- All proposed projects will be designed and locations selected to minimize disturbances to known Ute ladies'-tresses orchid populations, and if the avoidance of adverse effects is not possible, the BLM will re-initiate consultation with the Service. Projects will not be authorized closer than 0.25 miles from any known Ute ladies'-tresses populations without concurrence of the USFWS and the BLM authorized officer. No ground disturbing construction activities will be authorized within 0.25 miles of any known Ute ladies'-tresses orchid populations during the essential growing season time period (from July to September, the growing, flowering and fruiting stages) to reduce impacts to the species.

<u>BLM Wyoming Statewide Programmatic BA for Ute Ladies'-Tresses Orchid Best Management Practices</u>

- When project proposals are received, the BLM will initiate coordination with the USFWS at the earliest possible date so that both agencies can advise on project design. This should minimize the need to redesign projects at a later date to include orchid conservation measures, determined as appropriate by the USFWS.

- The BLM will coordinate with the USFWS, the Natural Resources Conservation Service (NRCS), and private landowners to ensure adequate protection for the Ute ladies'-tresses orchid and its habitat when new activities are proposed, and to work proactively to enhance the survival of the plant.

- In the event that a new population of the orchid is found, the USFWS Wyoming Field Office (307-772-2374) will be notified within 48 hours of discovery.

- For the protection of the Ute ladies'-tresses orchid and its potential habitat, surface-disturbing activities should be avoided in the following areas when they occur outside the protective 0.25-mile buffer from populations of the Ute ladies'-tresses orchid: (a) identified 100-year flood plains, (b) areas within 500 feet from perennial waters, springs, wells, and wetlands, and (c) areas within 100 feet of the inner gorge of ephemeral channels.

BLM National Sage-Grouse Habitat Conservation Strategy's Suggested Management Practices (BLM 2004)

- Steps such as recontouring, respreading topsoil, revegetating all disturbed areas not needed are suggested. The use of native species of shrubs, forbs, and grasses in seed mixes appropriate for each ecological site will also enhance habitat value for Greater Sage-Grouse.
- Reclaim unnecessary or redundant roads and facilities by removing surfacing material, reestablishing the original contour, spreading topsoil, and seeding to restore habitat.
- Encourage vegetative restoration along roads, ROWs, on well pads, and at existing facilities where habitat needs for Greater Sage-Grouse are not currently met.
- Require successful seeding of appropriate vegetation on any new disturbance associated with mineral and energy facility developments, livestock management facilities, and recreation facilities.

Northern Long-Eared Bat Interim Conference and Planning Guidance (USFWS 2014)
Measures that BLM is willing to fully commit to have been re-worded to reflect the BLM's commitment; and the measures have been re-ordered placing the committed conservation measures above the discretionary best management practices. Best Management Practices are discretionary measures as they cannot always be required due to valid and existing rights or other concerns. BLM will recommend all proposal appropriate BMPs to proponents, and include them in project level environmental analyses.

Hibernacula, Spring Staging and Fall Swarming Habitat (Oct. 1- May 14):

Conservation Measures

- BLM will take actions to protect Northern Long-Eared Bat hibernacula. Where a known Northern Long-Eared Bat hibernaculum is experiencing threats, BLM will work with the USFWS and other partners to provide the necessary protections (e.g., limit human disturbance, install bat-friendly gates, ensure the use of "clean" clothing and gear).
- BLM will participate in actions to manage and reduce the impacts of WNS on Northern Long-Eared Bats. A national plan was prepared by the USFWS and other state and federal agencies that details actions needed to investigate and manage WNS.
- BLM will avoid disturbing/injuring hibernating bats by:
    - Not entering Northern Long-Eared Bat hibernacula during the hibernation season, unless coordinated with the Service for survey, research, or other management purposes.
    - Complying with all cave and mine closures, advisories, and regulations.
- BLM will avoid destruction/alteration (e.g., fill, cause collapse of) of caves/mines that may support hibernating bats by:
    - Prohibiting woody vegetation or spoil (e.g., soil, rock, etc.) disposal within 100 feet of known hibernacula entrances and associated sinkholes, fissures, or other karst features.
    - When blasting within 0.5 mile of known or presumed known or presumed occupied hibernacula entrances and passages, BLM will coordinate with the USFWS to ensure that the

blasting will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of the hibernacula.

  - Avoiding modifying cave or mine entrances that support hibernating bats. If there are safety concerns or concerns about bats (e.g., disturbance, vandalism) at a site, only "bat friendly" cave/mine gates will be installed.

- BLM will avoid/minimize alterations of clean drinking water and foraging areas by:

  - Protecting potential recharge areas of cave streams and other karst features that are hydrologically connected to known or assumed hibernacula.

  - Setting back equipment servicing and maintenance areas at least 300 feet away from streambeds, sinkholes, fissures, or areas draining into sinkholes, fissures, or other karst or mine features.

  - Following available standards on spill prevention, containment, and control.

  - Restricting use of herbicides for vegetation management near known or assumed Northern Long-Eared Bat hibernacula to those specifically approved for use in karst (e.g., sinkholes) and water (e.g., streams, ponds, lakes, wetlands).

  - Implementing strict adherence to sediment and erosion control measures and reclamation standards.

- BLM will minimize the spread of WNS. If a cave or mine that could harbor hibernating bats must be entered, and it does not have a cave and mine closure policy, BLM follow approved WNS decontamination protocols. Under no circumstances will clothing, footwear, or equipment that was used in a WNS-affected state or region be used.

- BLM will avoid disturbing/killing/injuring Northern Long-Eared Bats by not clearing occupied spring staging and fall swarming habitat near known Northern Long-Eared Bat hibernacula during the staging and swarming seasons. Surveys will be conducted to determine occupancy prior to any tree clearing activities.

Best Management Practices

- Activities involving continuing (i.e., longer than 24 hours) noise disturbances greater than 75 decibels measured on the A scale (e.g., loud machinery) would be avoided within a one-mile radius of known Northern Long-Eared Bat hibernacula.

- Avoid disturbing/killing/injuring Northern Long-Eared Bats during spring staging/fall swarming by not clearing suitable spring staging and fall swarming habitat within 5.0 miles of known Northern Long-Eared Bat hibernacula during the staging and swarming seasons.

- Maintain spring staging/fall swarming forested habitat within 5.0 miles of known Northern Long-Eared Bat hibernacula.

  - Retain snags, dead/dying trees, and trees with exfoliating (loose) bark ≥3-inch diameter at breast height in areas ≤ one mile from water.

  - Minimize impacts to all forest patches.

- Maintain forest patches and forested connections (e.g., hedgerows, riparian corridors) between patches.
- Maintain natural vegetation between forest patches/connections and developed areas.

Summer Habitat (May 15 - Sep 30):

Conservation Measures

- BLM will determine where Northern Long-Eared Bats occur in the summer.
  - Coordinate with partners to gather and evaluate Northern Long-Eared Bat location information.
  - Review both positive and negative data (e.g., acoustic transect surveys).
- BLM will take actions to protect Northern Long-Eared Bats and their habitat within known Northern Long-Eared Bat home ranges.
- BLM will avoid killing or injuring Northern Long-Eared Bats during tree clearing activities by not clearing occupied maternity colony summer habitat during the summer maternity season. Surveys will be conducted to determine occupancy prior to any tree clearing activities.
- BLM will minimize other direct effects to Northern Long-Eared Bats by not clearing occupied summer habitat during the time of year when females are pregnant or the pups are incapable of flight. Surveys will be conducted to determine occupancy prior to any tree clearing activities.
- BLM will avoid/minimize altering clean drinking water and foraging areas by:
  - Implementing sediment and erosion control measures and reclamation standards.
  - Siting equipment servicing and maintenance areas at least 300 feet away from waterbodies (e.g., wetlands, streams). Following available standards on spill prevention, containment, and control.
- BLM will maintain summer maternity habitat by:
  - Retaining known roost trees, which includes live or dead trees and snags ≥3 inches diameter at breast height that have exfoliating bark, cracks, crevices, or cavities. Surveys will be conducted to determine occupancy prior to any tree clearing activities.
  - Clearly demarcating trees to be protected vs. cut to help ensure that contractors do not accidentally remove more trees than anticipated.

Best Management Practices

- Determine where Northern Long-Eared Bats occur in the summer by performing baseline bat surveys.
- BLM will minimize direct effects by avoiding construction activities after sunset in known or suitable summer habitat to avoid harassment of foraging Northern Long-Eared Bats.
- BLM will avoid/minimize altering clean drinking water and foraging areas by:

- Minimizing use of herbicides and pesticides. If necessary, spot treatment is preferred over aerial application.
- Minimize use of chemicals in/around storm water detention basins.
- Minimize potential lighting impacts (e.g., reduce the number of lights, use motion sensors, use shields/full cut-off lens, angle lights downward and away from forest).
- Contaminants, including but not limited to oils and solvents, would be controlled so the quality, quantity, and timing of prey resources are not affected.
- Avoiding filling, channelizing, or degrading streams, wetlands, and other watering areas where possible.

- BLM will maintain summer maternity habitat by:
  - Retaining and avoiding potential roost trees, which includes live or dead trees and snags ≥3 inches diameter at breast height that have exfoliating bark, cracks, crevices, or cavities. Not removing trees surrounding potential roosts to maintain the microclimate.
  - Where possible and not a safety hazard, leaving dead or dying trees standing.
  - Avoiding reducing the suitability of forest patches with known Northern Long-Eared Bat use.
  - Maintaining or improving forest patches.
  - Avoiding/minimizing tree clearing that fragments large forested areas or tree lined corridors. For example, routing linear features along the edge of a woodlot instead of through the middle of it; using horizontal directional drilling for pipeline crossings of wooded stream corridors and upland tree lines.

A Conservation Plan for Bats in Wyoming (Hester and Grenier 2005)
Measures that BLM is willing to fully commit to have been re-worded to reflect the BLM's commitment; and the measures have been re-ordered placing the committed conservation measures above the recommended best management practices.

Conservation Measures

- BLM, in cooperation with the State of Wyoming and/or the Service, will implement inventory and monitoring to determine population status and habitat requirements, as additional information is necessary to guide management actions.
- BLM will manage BLM administered lands where *Myotis septentrionalis* occurs in such a way that provides adequate roosting and foraging habitat to maintain stable populations (that is, secure roosting sites; diverse, native foraging habitat; and uncontaminated water sources).
- BLM will evaluate and where appropriate require BMPs for natural caves and abandoned mines in areas where *Myotis septentrionalis* roosts.

Best Management Practices

- Retain all large-diameter snags, particularly those greater than 21 centimeters (8 inches) diameter at breast height (Schmidt 2003), as potential roost sites for *Myotis septentrionalis* and other snag-dependent species. Provide large-diameter snags in early states of decay,

particularly snags with large amounts of exfoliating bark (Lacki and Schwierjohann 2001). Retain mature and decadent trees for future snag production, particularly where existing snags are few. Because the northern myotis switches tree roosts frequently and may need several suitable roosts over the course of a summer (Foster and Kurta 1999; Caceres and Barclay 2000), retain all snags in areas where bats are known to roost.

- Implement BMPs for natural caves and abandoned mines in areas where *Myotis septentrionalis* roosts.

- Avoid or minimize pesticide use in areas where the *Myotis septentrionalis* is known to occur to avoid direct poisoning and to maintain a food source for this species and other insectivores. Where possible, allow insect outbreaks to proceed naturally.

Bureau of Land Management White-nose Syndrome Interim Response Strategy (Washington Office Instruction Memorandum No. 2010-181 [BLM 2010d])

- BLM will coordinate and conduct outreach with appropriate internal and external stakeholders to prevent or contain the spread of WNS.

- BLM will identify caves and abandoned mine features with important bat resources (refer to all three attachments for more detail).

- BLM will follow the Containment and Decontamination Procedures for Bureau of Land Management Administered Lands to Minimize the Spread of White-Nose Syndrome in Caves and Abandoned Mines August 5, 2010 outlined in WO IM No. 2010-181.

- BLM will participate in interagency groups to develop state WNS response plans.

- BLM will recommend locations to test for the presence of WNS at a subset of the sites that have been identified as having important bat resources and support WNS research efforts where practicable and feasible within budgetary constraints.

A Strategic Plan for White-nose Syndrome in Wyoming (Abel and Grenier 2011)

- BLM will coordinate with the State of Wyoming and the Service to implement Wyoming's strategic plan for WNS prevention, and continue to work with the WGFD and other stakeholders in minimizing the risk of WNS spread into Wyoming.

Air Quality

Proposed Management Actions for Air Quality

The Proposed RMP includes the following air quality management actions that may benefit Threatened and Endangered species:

- Manage prescribed burns to comply with Wyoming Department of Environmental Quality Air Quality Division smoke-management rules and regulations. (AQ-1001)

- Implement mitigation measures within BLM's authority (BMPs – for example, dust suppression) to reduce emissions from current levels in the planning area and work cooperatively to encourage industry and other permittees to adopt measures to reduce emissions. (AQ-1003)

- Work cooperatively with stakeholders to reduce cumulative dust emissions (i.e., Campbell County Dust Coalition) and address other air quality concerns. (AQ-1005)

- Require quantitative Air Quality modeling of proposed activities in consultation with stakeholders in order to determine the potential impacts of proposed emission sources and potential mitigation strategies for projects expected to approach or exceed ambient air quality standards. (AQ-1006)

Conservation Measures Specific to Air Quality
No conservation measures specific to Air Quality Management are identified.

Impact Analysis and Effects Determination
A summary of the air quality resources within the planning area can be found in the Buffalo RMP Revision in Section 3.1.1, the *Air Quality* section of Chapter 3. This summary and the proposed management actions were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – Currently no air quality monitoring stations exist in Ute ladies'-tresses orchid potential habitats within the Buffalo planning area. Typically air quality monitoring stations are not located in riparian habitat. No air quality monitoring stations are anticipated to be constructed near Ute ladies'-tresses orchid potential habitat. Implementing air quality management actions will result in *no effect (NE)* to the Ute ladies'-tresses orchid. This determination is based on the absence of air quality monitoring stations in riparian habitat, the lack of plans to construct an air quality monitoring station near Ute ladies'-tresses orchid potential habitats, and the current absence of this species in the planning area.

Northern Long-Eared Bat – Limited suitable northern long-eared bat habitat is present in the planning area. Currently no air quality monitoring stations exist within potential habitat in the planning area. It would be unlikely that monitoring stations would be constructed in forested habitats due to the lack of visibility and chance that the density of trees would make measurements inaccurate. If a monitoring station were constructed in suitable habitat, trees may be removed; however, conservation measures would be implemented to ensure that habitat removal and surface disturbance does not occur when bats are present. Habitat loss would be minimal. The construction and maintenance of air quality monitoring stations near forested habitats would be analyzed on a site-specific basis and the BLM would apply appropriate conservation measures such as clearance surveys, avoidance, and timing restrictions for construction activities and habitat removal; the actions associated with air quality management are relatively small in scope and of short duration. Implementing air quality management actions *may affect, not likely to adversely affect (NLAA-i)* the species. This determination is based on insignificant impacts due to management actions that are relatively small in scope and of short duration that are not likely to occur in suitable habitat, as well as management actions and conservation measures for special status species which minimize and mitigate adverse impacts.

Cumulative Effects – Cumulative effects resulting from air quality activities in the planning area include future state, tribal, local, or private actions reasonably certain to occur in the planning area, and are anticipated to be greater. Air quality monitoring stations may be constructed on state, tribal local, or private lands in the planning area. The nature of the impacts are likely to be the same on all land ownerships.

Soil

Proposed Management Actions for Soil
The Proposed RMP includes the following soil management actions that may benefit Threatened, Endangered, and Proposed species:

- Evaluate the effects of a proposed surface-disturbing activity to the soil resource using NRCS Soil Survey data and/or onsite investigation. Apply mitigation measures if necessary, relocate the activity to a more suitable soil type, or deny the authorization. (Soil-1001)

- Authorized surface-disturbing activities will include plans for reclamation; site-specific reclamation actions should reflect the complexity of the project, environmental concerns, and the reclamation potential of the site. (Soil-1002)

- Allow surface-disturbing activities on soils without a severe erosion hazard. Activities on highly erosive soils would be allowed with approved site-specific construction, stabilization, and reclamation plans to conserve the soil resource and meet reclamation and resource objectives. (Soil-1003)

- Apply a CSU stipulation on soils with a severe erosion hazard with approved site-specific construction, stabilization, and reclamation plans. (Soil-1004)

- Allow surface-disturbing activities on slopes less than 25%. Activities on slopes 25% and greater would be allowed with approved site-specific construction, stabilization, and reclamation plans to conserve the soil resource and meet reclamation and resource objectives. (Soil-1005)

- Apply a CSU stipulation on all slopes 25% and greater with approved site-specific construction, stabilization, and reclamation plans. (Soil-1006)

- Allow surface-disturbing activities on soils with poor reclamation suitability recognizing that reclamation may be challenging and that construction, stabilization, and reclamation plans are required to conserve the soil resource. (Soil-1007)

- Apply a lease notice on soils with poor reclamation suitability identifying that reclamation may be challenging and that construction, stabilization, and reclamation plans are required to conserve the soil resource. (Soil-1008)

- Avoid surface-disturbing activities on limited reclamation potential areas such as badlands, rock outcrops, biologic crusts, and slopes susceptible to mass movement. Activities may be allowed in limited cases with an approved site-specific construction, stabilization, and reclamation plans to conserve the soil resource and meet reclamation and resource objectives. (Soil-1009)

- Apply a CSU stipulation on limited reclamation potential areas such as badlands, rock outcrops, biologic crusts, and slopes susceptible to mass movement with approved site-specific construction, stabilization, and reclamation plans. (Soil-1010)

Conservation Measures Specific to Soil
The following Conservation Measure, identified in BA Section 9, may benefit listed or proposed species and is specific to soil management:

- Within the potential of the ecological site (soil type, landform, climate, and geology), the BLM will ensure that the soils are stable and allow for water infiltration to provide for optimal

plant growth and minimal surface runoff. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- BLM will avoid woody vegetation and spoil (e.g., soil, rock, etc.) disposal within 100 feet of known Northern Long-Eared Bat hibernacula entrances and associated sinkholes, fissures, or other karst features. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- Avoid/minimize altering clean drinking water and foraging areas. Implement strict adherence to sediment and erosion control measures and reclamation standards. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

Impact Analysis and Effects Determination
A summary of the soil resources within the planning area can be found in the Buffalo RMP Revision in Section 3.1.3, the *Soils* section of Chapter 3. This summary, the proposed management actions, and above Conservation Measures were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – Activities associated with soil resources are not expected to impact the Ute ladies'-tresses orchid in an adverse way and may even lead to beneficial impacts. Soil mapping or sampling actions, including soil testing, may result in minimal impacts to Ute ladies'-tresses orchid potential habitat due to the short duration of time spent sampling and the reclamation of the disturbance. Management actions that improve habitats through revegetation, reseeding, and other rehabilitation actions may benefit the Ute ladies'-tresses orchid habitat. Reductions in sedimentation and erosion within the drainages and waterways also will benefit the Ute ladies'-tresses orchid habitat. Construction of sediment control and watershed stabilization projects may benefit Ute ladies'-tresses orchid habitat. Soil-damaging actions are prohibited on moist soils where the Ute ladies'-tresses orchid typically is found. Implementing soil management actions *may affect, not likely to adversely affect*, the Ute ladies'-tresses orchid due to *beneficial effects (NLAA-b)*. This determination is based on the localized, infrequent occurrence and relatively small scale of these actions, benefits to potential habitat, existing conservation measures in place to protect this species, and the current absence of the species from the planning area and scattered nature of Ute ladies'-tresses orchid populations.

Northern Long-Eared Bat – Limited suitable habitat is present in the planning area. Actions to alleviate and/or avoid soil erosion are not expected to adversely impact the northern long-eared bat. Soil resource program actions associated with soil sampling are localized in nature and of short duration, and will not impact habitat. Soil mapping or sampling actions, including soil testing, will not result in the removal of trees, and would not occur during sensitive periods. Management actions that improve and restore habitats, such as revegetation and prevention of erosion and sedimentation, would benefit the species by protecting habitat function. Surface disturbance is typically restricted on slopes in excess of 25% slopes, without site-specific stabilization and reclamation plans. Suitable forested habitat in northern Campbell County occurs on ridges and break topography with steep slopes. The likelihood of surface disturbance occurring in these areas is minimal. Implementing soil-management actions *may affect, not likely to adversely affect (NLAA-d)* the northern long-eared bat. This determination is based on the probability that actions would not occur in suitable habitat and that special status species actions and conservation measures would restrict disruptive activities during sensitive time periods.

Cumulative Effects – Cumulative effects include future state, tribal local, or private actions reasonably certain to occur in the planning area. Actions that disturb or compact soil, disrupt soil stability, or reduce soil productivity could adversely impact listed or proposed species on

non-federal lands. Actions that stabilize soils or increase soil productivity may benefit these species. As these types of actions occur on non-federal lands, the adverse or beneficial impacts may influence the habitats of listed or proposed species.

Water

Proposed Management Actions for Water
The Proposed RMP includes the following water management actions that may benefit Threatened and Endangered species:

- Provide an alternative or "off-source" water supply (e.g., piping water to troughs, tanks, or ponds) in locations where BLM-authorized uses are fenced out of water sources. (Water-1001)
- Install flow-control devices on new and existing BLM-authorized water wells and spring developments and evaluate the need for additional flow-control devices on a project specific basis. (Water-1002)
- Manage surface-disturbing activities to prevent degradation of water quality for all waters. (Water-1004)
- Minimize impacts to groundwater quality and quantity during BLM-authorized actions. (Water-1005)
- Manage water resources to meet the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for the Public Lands Administered by the BLM in the State of Wyoming*, achieve Proper Functioning Condition, and meet Wyoming water quality standards. Take appropriate actions to improve the biological, chemical, and geomorphic conditions of streams adversely impacted by BLM authorized actions and permitted activities. (Water-1006)
- Design and manage land use and surface-disturbing activities to reduce channel and bank erosion and the associated loss of riparian habitats. (Water-1007)
- Allow for on-channel reservoirs affecting natural streamflow regimes in consideration of other resource values. (Water-1008)
- Maintain existing water supply sources where possible; otherwise, supply new water sources to meet demand and need, consistent with other resources. (Water-1010)
- Allow abandoned oil and gas wells to be converted to water supply wells if a beneficial use (livestock, recreation, and wildlife) can be demonstrated. (Water-1011)
- Encourage alternative energy (e.g., solar and wind) to power new water resource developments versus overhead power or petroleum based. (Water-1012)
- Allow surface disturbance within 500 feet of springs, non-CBNG reservoirs, water wells, or perennial streams where water and other resource objectives (including, but not limited to soil, slope, and vegetation) can be met. (Water-1013)
- Apply a CSU stipulation to any fluid mineral lease within 500 feet of any spring, non-CBNG reservoir, water well, or perennial stream, based on other resource values, including, but not limited to soil, slope, and vegetation. (Water-1014)

- Manage riparian and uplands to restore perennial flows or standing water. (Water-1015)
- Evaluate unneeded reservoirs for removal and reclamation. (Water-1016)

Conservation Measures Specific to Water
The following are Conservation Measures, identified in BA Section 9, that may benefit listed or proposed species and are specific to water management:

- The BLM will manage stream habitats to retain, re-create, or mimic natural hydrology, water quality, and related vegetation dynamics. Projects that may alter natural hydrology or water quality, change the vegetation of the riparian ecosystem, or cause direct ground disturbance will be evaluated and redesigned to ensure that adverse effects to populations of the Ute ladies'-tresses orchid do not occur. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)
- Maintain and restore the dynamics of stream systems, including the movement of streams within their floodplains, which are vital for the life-cycle of the orchid. (BLM Wyoming Programmatic Statewide Ute Ladies'-Tresses Orchid BA)
- Perform monitoring and analysis pertaining to flow timing, flow quantity, and water table characteristics with the goal of ensuring that riparian vegetation, in areas of known and potential habitat for the orchid, is maintained. (BLM Wyoming Programmatic Statewide Ute Ladies'-Tresses Orchid BA)
- Protect potential recharge areas of cave streams and other karst features that are hydrologically connected to known or assumed hibernacula. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- Within known habitat, implement strict adherence to sediment and erosion control measures and reclamation standards. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will avoid/minimize altering clean drinking water and foraging areas by:
    - Implementing sediment and erosion control measures and reclamation standards.
    - Siting equipment servicing and maintenance areas at least 300 feet away from waterbodies (e.g., wetlands, streams). Following available standards on spill prevention, containment, and control. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

Impact Analysis and Effects Determination
A summary of the water resources within the planning area can be found in the Buffalo RMP Revision in Section 3.1.4, the *Water Resources* section of Chapter 3. This summary, the proposed management actions, and above Conservation Measures were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – Management actions associated with water resources are infrequent and typically small in scale. Water monitoring activities are not anticipated to impact the orchid. Construction of reservoirs or monitoring stations in suitable habitat could remove habitat; however, these activities would not occur in occupied habitat. Occupancy surveys would be conducted in any suitable habitat prior to project approval to determine the presence of the species. Although not expected to occur, water diversions could significantly reduce riparian habitat for the orchid and if present, possibly cause the loss of a population. Overall, these types

of water management actions may benefit the species and its habitat by maintaining or improving riparian habitat condition. Managing riparian and uplands to restore perennial flows or standing water would also benefit the Ute ladies'-tresses orchid. Implementing water resource management actions *may affect, not likely to adversely affect*, the Ute ladies'-tresses orchid due to *discountable effects (NLAA-d)*. This determination is based on no known populations of Ute ladies'-tresses orchid occurring in the planning area and the incorporation of conservation measures. If water resource management actions are conducted in potential Ute ladies'-tresses orchid habitat, this species could incur beneficial effects of habitat improvement. Secondary beneficial effects may be realized for the Ute ladies'-tresses orchid through habitat maintenance and improvements.

Northern Long-Eared Bat – Limited suitable habitat is present in the planning area. Management actions associated with water resources are infrequent and typically small in scale. Water resource management does not generally occur in northern long-eared bat habitat; however, bats are likely to utilize naturally occurring (streams, springs) or improved (tanks or reservoirs) open water sources near roosting and foraging habitat. Stock tanks on BLM-administered surface lands near suitable habitat would be designed to be easily accessed by bats and equipped with wildlife escape ramps to mitigate risks to bats. Actions taken to improve water quality and promote the proper functioning condition of naturally occurring waters are a benefit to the species. Construction of reservoirs or monitoring stations would not occur within occupied habitat (verified by survey) during sensitive periods for the bat. Suitable habitat is not expected to be lost. Bats would not be foraging while active construction was taking place. Surface disturbance would not be allowed within 500 feet of riparian areas if it would negatively impact the species, thereby protecting foraging and watering areas. The likelihood that water management actions will affect the species is minimal and impacts that may occur from construction such as increased erosion potential will be short-term. Therefore, supporting and encouraging water supply sources near suitable habitat *may affect, not likely to adversely affect (NLAA-i)* the species due to both beneficial and insignificant effects.

Cumulative Effects – Cumulative effects include future state, tribal local, or private actions reasonably certain to occur in the planning area. Protection and enhancement of water resources in the planning area on non-federal lands will improve habitat for listed or proposed species. Surface disturbance and other actions could increase sedimentation of waterways and may potentially impact listed or proposed species.

Cave and Karst Resources

Proposed Management Actions for Cave and Karst Resources

The Proposed RMP does not propose management actions for cave and karst resources that may benefit the Ute ladies'-tresses orchid as cave and karst formations do not overlap orchid habitat. The following management actions may benefit northern long-eared bat:

- Conduct cave inventories and significance determinations. (Cave-1001)
- Inventory and map cave and karst areas. (Cave-1002)
- Manage human activity in caves with significant resources by developing and implementing a Cave Management Plan for the planning area, with potential cave specific components. (Cave-1003)

- Apply a CSU stipulation within cave and karst areas. Mineral resource activities would likely be required to maintain a site-specific buffer around significant cave entrances and passages. (Cave-1004)
- Require a site-specific buffer from significant cave entrances for surface-disturbing activities. (Cave-1005)
- Require forest management to maintain a site-specific buffer from significant cave entrances. (Cave-1006)
- Restrict livestock from entrances to significant caves. (Cave-1007)

Conservation Measures Specific to Cave and Karst Resources
The following are Conservation Measures, identified in BA Section 9, that may benefit Threatened, Endangered, and Proposed species are specific to Cave and Karst Management:

- BLM will take actions to protect Northern Long-Eared Bat hibernacula. Where a known Northern Long-Eared Bat hibernaculum is experiencing threats, BLM work with the USFWS and other partners to provide the necessary protections (e.g., limit human disturbance, install bat-friendly gates, ensure the use of "clean" clothing and gear). (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will participate in actions to manage and reduce the impacts of WNS on Northern Long-Eared Bats. A national plan was prepared by the USFWS and other state and federal agencies that details actions needed to investigate and manage WNS. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will avoid disturbing/injuring hibernating bats by:
    - Not entering Northern Long-Eared Bat hibernacula during the hibernation season, unless coordinated with the Service for survey, research, or other management purposes.
    - Complying with all cave and mine closures, advisories, and regulations. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will avoid destruction/alteration (e.g., fill, cause collapse of) of caves/mines that may support hibernating bats by:
    - Avoiding modifying cave or mine entrances that support hibernating bats. If there are safety concerns or concerns about bats (e.g., disturbance, vandalism) at a site, only "bat friendly" cave/mine gates will be installed. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will minimize the spread of WNS. If a cave or mine that could harbor hibernating bats must be entered, and it does not have a cave and mine closure policy, BLM follow approved WNS decontamination protocols. Under no circumstances will clothing, footwear, or equipment that was used in a WNS-affected state or region be used. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- Activities involving continuing (i.e., longer than 24 hours) noise disturbances greater than 75 decibels measured on the A scale (e.g., loud machinery) would be avoided within a one-mile radius of known Northern Long-Eared Bat hibernacula. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- Implement BMPs for natural caves and abandoned mines, where possible, in areas where *Myotis septentrionalis* roost. (A Conservation Plan for Bats in Wyoming)

- Coordinate and conduct outreach with appropriate internal and external stakeholders to prevent or contain the spread of WNS. (Washington Office [WO] IM 2010-181)

- Consider restricting access to caves and abandoned mines on BLM-administered lands in the planning area. (WO IM 2010-181)

- Follow the Containment and Decontamination Procedures for Bureau of Land Management Administered Lands to Minimize the Spread of White-Nose Syndrome in Caves and Abandoned Mines August 5, 2010 outlined in WO IM No. 2010-181. (WO IM 2010-181)

- Recommend locations to test for the presence of WNS at a subset of the sites that have been identified as having important bat resources and support WNS research efforts where practicable and feasible within budgetary constraints. (WO IM 2010-181)

- Implement the guidelines described in Wyoming's strategic plan for prevention, and continue to work with the WGFD and other stakeholders in minimizing the risk of WNS spread into Wyoming. (A Strategic Plan for White-nose Syndrome in Wyoming)

Impact Analysis and Effects Determination
A summary of the cave and karst resources within the planning area can be found in the Buffalo RMP Revision in Section 3.1.5, the *Cave and Karst Resources* section of Chapter 3. This summary and the proposed management actions were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – There are no direct or indirect effects anticipated for the Ute ladies'-tresses orchid, as this species does not occur on karst formations (RMP Map 7). Implementing management actions associated with cave and karst resources would have *no effect (NE)* on the Ute ladies'-tresses orchid.

Northern Long-Eared Bat – There are no caves in northern Campbell County that could potentially serve as hibernacula for northern long-eared bats (RMP Map 7). Water soluble formations required for cave formation, such as limestone or dolomite, are not present in Campbell County. The only known occurrence of caves on BLM-administered lands in the planning area are in the Big Horn Mountains, which is outside the current known range for the species. Therefore, implementing the actions for cave and karst will have *no effect (NE)* on northern long-eared bat.

Cumulative Effects – Cumulative effects include future state, tribal local, or private actions reasonably certain to occur in the planning area. Recreational use of caves on non-federal lands could occur but is not anticipated to impact either species due to lack of caves and karst within the planning area.

Mineral Resources - Locatable

Proposed Management Actions for Locatable Minerals
The following management actions may benefit Ute ladies'-tresses orchid and northern long-eared bat:

- Implement the MOUs between BLM and Wyoming DEQ, and BLM and the Nuclear Regulatory Commission (NRC), addressing locatable mineral exploration, development, and reclamation activities. (Locatable-2002)

- Recommend withdrawals from mineral entry for areas identified within Alternative D to conserve other resource values. (Locatable-2003)

Conservation Measures Specific to Locatable Mineral Resources
The following are Conservation Measures, identified in BA Section 9, that may benefit listed or proposed species and are specific to locatable mineral resource management:

- Reduce habitat loss associated with mineral exploration and development by consolidating facilities as much as possible. The possibility of burying utility and flow lines beneath or along roads, centralizing tank batteries, and drilling multiple wells from a single location should be considered. (BLM National Sage-Grouse Habitat Conservation Strategy)

- Design and construct mineral exploration and development operations so as to disturb the smallest footprint practical on the landscape while meeting all safety requirements. (BLM National Sage-Grouse Habitat Conservation Strategy)

- Plan and construct mining and mineral development activities, to the degree possible given state water rights, to minimize disturbances that would result in alterations to springs and riparian Greater Sage-Grouse habitat. Alternative water sources may be developed to replace natural sources that have been affected or destroyed during these development activities. (BLM National Sage-Grouse Habitat Conservation Strategy)

- Avoid surface and sub-surface water depletion that impacts sage-grouse habitats. (Northeast Wyoming Sage-Grouse Conservation Plan)

- BLM will avoid destruction/alteration (e.g., fill, cause collapse of) of caves/mines that may support hibernating bats by:

    - Prohibiting woody vegetation or spoil (e.g., soil, rock, etc.) disposal within 100 feet of known hibernacula entrances and associated sinkholes, fissures, or other karst features.

    - When blasting within 0.5 mile of known or presumed known or presumed occupied hibernacula entrances and passages, BLM will coordinate with the USFWS to ensure that the blasting will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of the hibernacula.

    - When drilling or hydraulic fracturing within 0.5 mile of a known or presumed occupied hibernacula entrances and passages, BLM will coordinate with the USFWS to ensure that the drilling will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of the hibernacula.

    - Avoiding modifying cave or mine entrances that support hibernating bats. If there are safety concerns or concerns about bats (e.g., disturbance, vandalism) at a site, only "bat friendly" cave/mine gates will be installed. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- BLM will avoid/minimize alterations of clean drinking water and foraging areas by:

- Protecting potential recharge areas of cave streams and other karst features that are hydrologically connected to known or assumed hibernacula.
- Setting back equipment servicing and maintenance areas at least 300 feet away from streambeds, sinkholes, fissures, or areas draining into sinkholes, fissures, or other karst or mine features.
- Following available standards on spill prevention, containment, and control.
- Restricting use of herbicides for vegetation management near known or assumed Northern Long-Eared Bat hibernacula to those specifically approved for use in karst (e.g., sinkholes) and water (e.g., streams, ponds, lakes, wetlands).
- Implementing strict adherence to sediment and erosion control measures and reclamation standards. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- BLM will avoid disturbing/killing/injuring Northern Long-Eared Bats during spring staging/fall swarming by not clearing occupied spring staging and fall swarming habitat near known Northern Long-Eared Bat hibernacula during the staging and swarming seasons. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will avoid killing or injuring Northern Long-Eared Bats during tree clearing activities by not clearing occupied maternity colony summer habitat during the summer maternity season. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will minimize other direct effects to Northern Long-Eared Bats by not clearing occupied summer habitat during the time of year when females are pregnant or the pups are incapable of flight. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will avoid/minimize altering clean drinking water and foraging areas by:
  - Implementing sediment and erosion control measures and reclamation standards.
  - Siting equipment servicing and maintenance areas at least 300 feet away from waterbodies (e.g., wetlands, streams). Following available standards on spill prevention, containment, and control. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

Impact Analysis and Effects Determination
A summary of the locatable mineral resources within the planning area can be found in the Buffalo RMP Revision in Section 3.2.1, the *Locatable Minerals* section of Chapter 3. This summary, the proposed management actions, and above Conservation Measures were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – There are no known populations of ULT occurring in the planning area. Locatable minerals include gypsum, bentonite, and uranium. Gypsum development within the planning area is presently not economical, there are no mining operations within the planning area, nor are any reasonably foreseeable. ULT would not typically occur in the clay soils where bentonite is found. The WYNDD potential distribution model identifies southern Campbell County to be the most suitable for ULT within the Buffalo planning area (Heidel

2007). Uranium potential is highest in southern Campbell and Johnson Counties (RMP Map 9). Mining of locatable minerals would entail using heavy equipment such as scrapers or dozers to remove topsoil and could increase erosion potential. Suitable habitat may be removed; however, clearance surveys would ensure that no known population would be destroyed. The potential for direct effects will be minimized by the avoidance of surface-disturbing activities within 500 feet of riparian/wetland areas. Implementation of erosion control measures should minimize impacts to surrounding riparian areas from surface-disturbing activities. Implementation of locatable minerals management actions *may affect, not likely to adversely affect* the Ute ladies'-tresses orchid *(NLAA-d)*. This determination is based on the low potential of locatable mineral entry to take place in potential habitats for Ute ladies'-tresses orchid. Projects will be designed and conservation measures implemented to protect Threatened and Endangered species.

Northern Long-Eared Bat – The Proposed RMP would recommend mineral entry withdrawal from the Weston Hills and Burnt Hollow SRMAs (RMP Map 71), which may contain habitat suitable for roosting or foraging northern long-eared bats; other BLM surface lands in northern Campbell County would be open to locatable mineral entry. The potential for locatable mineral mining in suitable habitat for the species is extremely low; high potential occurrence/mining areas for gypsum, bentonite and uranium are all outside the current known distribution of the species, and these are the only areas where development is expected to occur (RMP Map 9). It is extremely unlikely that locatable minerals would be developed outside of the areas shown on the map, but it is not impossible. Gypsum development within the planning area is presently not economical, there are no mining operations within the planning area, nor are any reasonably foreseeable. Changes in mining technologies and costs could increase the value of mineral deposits outside the high potential areas. Mining of locatable minerals would entail using heavy equipment such as scrapers or dozers to remove topsoil and could increase erosion potential, impacting habitat by removing trees or altering riparian habitat. Suitable habitat may be removed. The BLM would work with the proponent to reduce impacts to the bat, but because the bat is not a listed species, the proponent would not be required to include BLM recommendations in their mine plan. At the time of application for a mine permit, the proponent is likely to coordinate with the USFWS for recommendations on any species of concern, which the Wyoming DEQ may require in the plan. Although restricting development within these two SRMA's would conserve habitat, it would be a negligible benefit to the species. Implementation of the management actions *may affect, not likely to adversely affect (NLAA-d)* the species due to discountable effects. This determination is based on the unlikely probability that activities will occur in suitable habitat.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Additional surface disturbance from locatable mineral actions on non-federal lands could adversely impact listed or proposed species by further fragmenting the habitats, increasing road densities, spreading invasive species, and degrading habitats for these species.

Leasable Minerals – Coal

Proposed Management Actions for Leasable Coal

The Proposed RMP does not propose management actions for leasable - coal minerals that benefit Threatened and Endangered species.

Conservation Measures Specific to Leasable - Coal Mineral Resources

The following are Conservation Measures, identified in BA Section 9, that may benefit listed or proposed species and are specific to leasable - coal mineral resource management:

- Where existing leases or ROWs have had some level of development (road, fence, well, etc.) and are no longer in use, reclaim the site by removing these features and restoring the habitat. (BLM IM 2012-044)

- Reduce habitat loss associated with mineral exploration and development by consolidating facilities as much as possible. The possibility of burying utility and flow lines beneath or along roads, centralizing tank batteries, and drilling multiple wells from a single location should be considered. (BLM National Sage-Grouse Habitat Conservation Strategy)

- Design and construct mineral exploration and development operations so as to disturb the smallest footprint practical on the landscape while meeting all safety requirements. (BLM National Sage-Grouse Habitat Conservation Strategy)

- Plan and construct mining and mineral development activities, to the degree possible given state water rights, to minimize disturbances that would result in alterations to springs and riparian Greater Sage-Grouse habitat. Alternative water sources may be developed to replace natural sources that have been affected or destroyed during these development activities. (BLM National Sage-Grouse Habitat Conservation Strategy)

- Avoid surface and sub-surface water depletion that impacts sage-grouse habitats. (Northeast Wyoming Sage-Grouse Conservation Plan)

- BLM will avoid killing or injuring Northern Long-Eared Bats during tree clearing activities by not clearing occupied maternity colony summer habitat during the summer maternity season. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- BLM will minimize other direct effects to Northern Long-Eared Bats by not clearing occupied summer habitat during the time of year when females are pregnant or the pups are incapable of flight. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- BLM will avoid/minimize altering clean drinking water and foraging areas by:

    - Implementing sediment and erosion control measures and reclamation standards.

    - Siting equipment servicing and maintenance areas at least 300 feet away from waterbodies (e.g., wetlands, streams). Following available standards on spill prevention, containment, and control. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

Impact Analysis and Effects Determination
A summary of the leasable coal mineral resources within the planning area can be found in the Buffalo RMP Revision in Section 3.2.2, the *Leasable Minerals – Coal* section of Chapter 3. This summary and the above Conservation Measures were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – Coal planning was completed as part of the April 2001 BFO RMP update and is being carried forward in this RMP revision. Coal leasing and development could occur in areas identified as acceptable for further coal leasing consideration (BLM 2001a), namely northern Sheridan and eastern Campbell counties. New lease applications are not foreseen within Sheridan County, which according to WYNDD is also unlikely to provide potential orchid habitat (Heidel 2007). Approximately 28 new coal leases encompassing 106,400 acres of disturbance are

forecasted within Campbell County during the life of the RMP (Appendix G). Several coal mines and a portion of the area acceptable for further coal leasing consideration, southeast of Wright, are located within the Antelope Creek drainage downstream of three known Ute ladies'-tresses orchid populations. The area acceptable for coal leasing is more than 10 miles downstream from the nearest known Ute ladies'-tresses orchid population. The WYNDD potential distribution model indicates that most of the suitable orchid habitat within the planning area is southwest of Wright (Heidel 2007), while the area acceptable for further coal leasing consideration is east and north of Wright (RMP Map 11).

The Campbell County area acceptable for further coal leasing, like the Powder River Basin in general, is semi-arid. Many riparian areas located in the area of interest are intermittent or ephemeral in nature, receiving flow contributions primarily from thunderstorm runoff and to a much lesser extent from spring snowmelt. The main perennial stream in the vicinity of the Wright area coal mines is Antelope Creek (BLM 2010h). Wetlands within the Basin are predominantly associated with ephemeral streams, playas, isolated depressions, reservoirs, and excavated upland areas; including all wetlands identified within six Wright area lease applications (BLM 2010h). As part of the leasing process, the six Wright Area lease applications were surveyed for Ute ladies'-tresses orchid multiple times, over at least three different years. Several of the mines in the area have carried out and recorded many years of Ute ladies'-tresses orchid surveys within their permit areas. It is unlikely that Ute ladies'-tresses orchid populations would remain undetected during multiple surveys over multiple years if Ute ladies'-tresses orchid was present in the area. Based on the WYNDD model, hydrology, and the numerous Ute ladies'-tresses orchid surveys that have been conducted in the area over multiple years, it is unlikely that there is occupied Ute ladies'-tresses orchid habitat within the Campbell County area acceptable for further coal leasing.

If undetected orchid populations were present within a mine area, they would be lost due to surface disturbing activities. Indirect effects to the Ute ladies'-tresses orchid could also occur, including increased human use in the area, potential spread of invasive or noxious species, elevated dust levels, and degradation or loss of the habitat.

In the coal leasing area, all Ute ladies'-tresses orchid survey work is carried out in accordance with USFWS guidelines and recommendations prior to issuing a leasing decision. BLM further consults with the USFWS if there is potential to adversely affect the orchid or any other listed species.

Implementing coal development management actions *may affect, likely to adversely affect (LAA)* the Ute ladies'-tresses orchid. This determination is based on BLM's inability to guarantee that a Ute ladies'-tresses orchid would not be harmed even with the lack of suitable habitat within potential coal development areas, as confirmed by multiple years of survey effort, and therefore the low potential for populations of the orchid to be within the areas identified as acceptable for further coal leasing. BLM will consult with the USFWS if the Ute ladies'-tresses orchid may potentially be affected by a BLM coal leasing action.

Northern Long-Eared Bat – Coal planning was completed as part of the April 2001 BFO RMP update. Coal development could occur in areas identified as acceptable for further coal leasing consideration (BLM 2001a), namely northern Sheridan and Campbell counties (RMP Map 11). No new leasing decisions are being proposed in the RMP revision. Approximately 10% of potential habitat identified by the USFWS could be affected by coal development; however, based on the distribution maps provided by WYNDD for the species, it is unlikely that coal mining will affect any occupied habitat. WYNDD's predicted occurrence for the species only includes a small

portion of forested habitat in northeast Campbell County, and does not overlap the coal leasing area. Because one individual bat was captured in the Spring Creek area, it is possible that the forested areas in close proximity to that area may also be occupied. Taking this into consideration, the habitat that would be affected is extremely limited. Areas that are mined will have complete habitat removal using heavy equipment. Suitable habitat present within mine area boundaries could be destroyed by heavy equipment, such as dozers or backhoes. The implementation of conservation measures will serve to avoid adverse impacts to individuals, though suitable habitat may still be lost. In addition, consultation with the USFWS will occur at the leasing stage, and if needed, stipulations applied to the lease. Coordination is also anticipated to occur during permit application with Wyoming DEQ. Implementing coal development management actions *may affect, not likely to adversely affect (NLAA-i)* the northern long-eared bat. This determination is based on the unlikelihood that coal development will occur within occupied habitats and the implementation of conservation measures to mitigate adverse impacts.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Coal mine operations occur on both state and private lands. These mines and associated infrastructure may affect habitats through increased human use in the area, potential spread of invasive or noxious species, elevated dust levels, and degradation or loss of habitat.

Leasable Minerals – Fluids

Proposed Management Actions for Leasable Fluids
The Proposed RMP includes the following management actions for leasable fluids resources that may benefit listed or proposed species:

- Continue to require lessees to conduct operations in a manner that minimizes adverse impacts to other resources and other land uses and users. (O&G-2001)

Conservation Measures Specific to Leasable – Fluid Mineral Resources
The following are Conservation Measures, identified in BA Section 9, that may benefit listed or proposed species and are specific to leasable – fluid mineral resource management:

- Apply a CSU stipulation to mineral leases within habitat for special status plant species. (SS Plants-4008)
- Apply a CSU stipulation to any fluid mineral lease within 500 feet of surface water, riparian or wetlands systems, and aquatic habitats. (Water-1014, Riparian-4009)
- Apply a CSU stipulation to mineral leases containing special status species habitat. Surveys required for clearance. (SS WL-4007)
- NSO will be allowed within special management areas (e.g., known threatened or endangered species habitat). (BLM Wyoming Programmatic Statewide Ute Ladies'-Tresses Orchid BA)
- The BLM will apply a COA on all applications for permit to drill (APDs) oil and gas wells for sites within 0.25 miles of any known populations of the Ute ladies'-tresses orchid. This condition will prohibit all authorized surface disturbance and off-highway vehicle (OHV) travel from sites containing populations of the Ute ladies'-tresses orchid. (BLM Wyoming Programmatic Statewide Ute Ladies'-Tresses Orchid BA)

- For known Ute ladies'-tresses orchid populations, the BLM will place a CSU stipulation prohibiting all surface disturbances on new oil and gas leases, buffering the area within 0.25 miles of known Ute ladies'-tresses orchid populations. (BLM Wyoming Programmatic Statewide Ute Ladies'-Tresses Orchid BA)

- Where existing leases or ROWs have had some level of development (road, fence, well, etc.) and are no longer in use, reclaim the site by removing these features and restoring the habitat. (BLM IM 2012-044)

- Reduce habitat loss associated with mineral exploration and development by consolidating facilities as much as possible. The possibility of burying utility and flow lines beneath or along roads, centralizing tank batteries, and drilling multiple wells from a single location should be considered. (BLM National Sage-Grouse Habitat Conservation Strategy)

- Design and construct mineral exploration and development operations so as to disturb the smallest footprint practical on the landscape while meeting all safety requirements. (BLM National Sage-Grouse Habitat Conservation Strategy)

- Plan and construct mineral development activities, to the degree possible given state water rights, to minimize disturbances that would result in alterations to springs and riparian Greater Sage-Grouse habitat. Alternative water sources may be developed to replace natural sources that have been affected or destroyed during these development activities. (BLM National Sage-Grouse Habitat Conservation Strategy)

- Steps such as recontouring, respreading topsoil, revegetating all disturbed areas not needed for well production, including cuts, fills, borrow ditches, and well pads up to the production facilities are suggested. Additionally, allowing room for the setup of work over rigs, and allowing future setup and parking on the top of new vegetation will minimize the need for future disturbances. (BLM National Sage-Grouse Habitat Conservation Strategy)

- Avoid surface and sub-surface water depletion that impacts sage-grouse habitats. (Northeast Wyoming Sage-Grouse Conservation Plan)

- BLM will avoid destruction/alteration (e.g., fill, cause collapse of) of caves/mines that may support hibernating bats by:

    - Prohibiting woody vegetation or spoil (e.g., soil, rock, etc.) disposal within 100 feet of known hibernacula entrances and associated sinkholes, fissures, or other karst features.

    - When blasting within 0.5 mile of known or presumed known or presumed occupied hibernacula entrances and passages, BLM will coordinate with the USFWS to ensure that the blasting will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of the hibernacula.

    - When drilling or hydraulic fracturing within 0.5 mile of a known or presumed occupied hibernacula entrances and passages, BLM will coordinate with the USFWS to ensure that the drilling will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of the hibernacula.

    - Avoiding modifying cave or mine entrances that support hibernating bats. If there are safety concerns or concerns about bats (e.g., disturbance, vandalism) at a site, only "bat

friendly" cave/mine gates will be installed. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- BLM will avoid/minimize alterations of clean drinking water and foraging areas by:
  - Protecting potential recharge areas of cave streams and other karst features that are hydrologically connected to known or assumed hibernacula.
  - Setting back equipment servicing and maintenance areas at least 300 feet away from streambeds, sinkholes, fissures, or areas draining into sinkholes, fissures, or other karst or mine features.
  - Following available standards on spill prevention, containment, and control.
  - Restricting use of herbicides for vegetation management near known or assumed Northern Long-Eared Bat hibernacula to those specifically approved for use in karst (e.g., sinkholes) and water (e.g., streams, ponds, lakes, wetlands).
  - Implementing strict adherence to sediment and erosion control measures and reclamation standards. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will avoid disturbing/killing/injuring Northern Long-Eared Bats during spring staging/fall swarming by not clearing occupied spring staging and fall swarming habitat near known Northern Long-Eared Bat hibernacula during the staging and swarming seasons. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will avoid killing or injuring Northern Long-Eared Bats during tree clearing activities by not clearing occupied maternity colony summer habitat during the summer maternity season. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will minimize other direct effects to Northern Long-Eared Bats by not clearing occupied summer habitat during the time of year when females are pregnant or the pups are incapable of flight. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will avoid/minimize altering clean drinking water and foraging areas by:
  - Implementing sediment and erosion control measures and reclamation standards.
  - Siting equipment servicing and maintenance areas at least 300 feet away from waterbodies (e.g., wetlands, streams). Following available standards on spill prevention, containment, and control. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

Impact Analysis and Effects Determination
A summary of the leasable - fluid mineral resources within the planning area can be found in the Buffalo RMP Revision in Section 3.2.3, the *Leasable Minerals – Fluids* section of Chapter 3. This summary, the proposed management actions, and above Conservation Measures were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – No Ute ladies'-tresses orchid populations are known to occur in the planning area. Oil and gas development in or near wetland/riparian areas may impact

potential habitat for Ute ladies'-tresses orchid through water diversion and channelization, soil erosion, stream bank degradation, and the spread of invasive species. BLM will protect wetlands/riparian areas by restricting or otherwise mitigating fluid mineral activities within 500 feet of springs, non-CBNG reservoirs, water wells, or perennial streams. An NSO restriction on wetland areas greater than 20 acres would also reduce these effects. Implementing oil and gas development management actions *may affect, likely to adversely affect (LAA)* the Ute ladies'-tresses orchid. This determination is based on the possibility that surface discharge of saline or other contaminated waters into a watershed above habitat occupied by the orchid would likely kill individuals or populations of orchids. Surface waters are under the jurisdiction of the State of Wyoming. The BLM is likely to approve discharge points when the project proponent has obtained the necessary State permits and the action is compatible with other resource values. If suitable habitat for the orchid were present at a proposed discharge site, surveys to determine presence of the species would be required prior to approval or the area would be avoided. Water quality is regulated by Wyoming Department of Environmental Quality, so the likelihood that concentrations of salts or contaminants would be so high that mortality would occur is minimal. Because exact locations of future discharge points or oil and gas wells are not known, the extent of effects is largely unknown. The effects are not anticipated to be extensive, since the only drainage that extends into the planning area where the orchid has been documented is Antelope Creek, in southern Campbell County. Although WYNDD's predictive distribution models (Heidel 2007) identify potential habitat in the planning area, a substantial survey effort over several years has not identified any new populations.

Northern Long-Eared Bat – Oil and gas development is the primary land disturbance activity permitted, and fluid minerals will be available for leasing in the majority of the planning area. The northern long-eared bat has only been positively identified to occur in northeastern Campbell County. Approximately 70% of potential habitat identified by the USFWS overlays federal mineral estate; however, based on the distribution maps provided by WYNDD for the species, the likelihood that oil and gas development will affect any occupied habitat is minimal. WYNDD's predicted occurrence for the species includes a small portion of forested habitat in northeast Campbell County. Because one individual bat was captured in the Spring Creek area, it is possible that the forested areas in close proximity to that area may also be occupied. Taking this into consideration, the habitat that would be affected is limited. The fluid mineral potential in most areas containing suitable habitat for the species is low to moderate for CBNG development and is negligible to low for conventional oil development (RMP Maps 23 and 24). Development of fluid minerals through construction of well pads, access roads, pipelines, and power lines may remove or fragment habitat suitable for roosting or foraging. Management actions will require mitigation for special status species including conducting clearance surveys prior to approval of projects, siting projects to avoid suitable habitat, and restricting removal of occupied habitat while bats are present; mitigation for surface-disturbing and disruptive activities will be considered and applied on a site-specific level. Even with siting and timing considerations, alteration of suitable habitat and increased human activities may cause the species to avoid areas near developed sites. Actions related to fluid minerals resources *may affect, not likely to adversely affect (NLAA-d)* the species due to the minimal probability that activities will occur in occupied habitat and the application of conservation measures for special status species.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Oil and gas development on private lands is expected to continue and there are opportunities for this activity on state and private mineral estate, potentially impacting listed or proposed species.

Salable Minerals

Proposed Management Actions for Salable Minerals
The Proposed RMP includes the following management action for salable mineral resources that may benefit listed or proposed species:

- Allow salable mineral exploration and development in accordance with management identified within the Proposed RMP, as consistent with other resource values. This results in 623,061 acres closed to salable mineral exploration and development. (Salable-2002)

Conservation Measures Specific to Salable Mineral Resources
The following are Conservation Measures, identified in BA Section 9, that may benefit listed or proposed species and are specific to salable mineral resource management:

- Allow salable mineral development within designated SRMAs for administrative use only. (Rec-6023)
- The disposal (sale and removal) of salable minerals is a discretionary BLM action and is prohibited within a 0.25 mile buffer area of known populations of Ute ladies'-tresses orchids. (BLM Wyoming Programmatic Statewide Ute Ladies'-Tresses Orchid BA)
- Reduce habitat loss associated with mineral exploration and development by consolidating facilities as much as possible. The possibility of burying utility and flow lines beneath or along roads, centralizing tank batteries, and drilling multiple wells from a single location should be considered. (BLM National Sage-Grouse Habitat Conservation Strategy)
- Design and construct mineral exploration and development operations so as to disturb the smallest footprint practical on the landscape while meeting all safety requirements. (BLM National Sage-Grouse Habitat Conservation Strategy)
- Plan and construct mining and mineral development activities, to the degree possible given state water rights, to minimize disturbances that would result in alterations to springs and riparian Greater Sage-Grouse habitat. (BLM National Sage-Grouse Habitat Conservation Strategy)
- Avoid surface and sub-surface water depletion that impacts sage-grouse habitats. (Northeast Wyoming Sage-Grouse Conservation Plan)
- BLM will avoid destruction/alteration (e.g., fill, cause collapse of) of caves/mines that may support hibernating bats by:
    - Prohibiting woody vegetation or spoil (e.g., soil, rock, etc.) disposal within 100 feet of known hibernacula entrances and associated sinkholes, fissures, or other karst features.
    - When blasting within 0.5 mile of known or presumed occupied hibernacula entrances and passages, BLM will coordinate with the USFWS to ensure that the blasting will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of the hibernacula.
    - Avoiding modifying cave or mine entrances that support hibernating bats. If there are safety concerns or concerns about bats (e.g., disturbance, vandalism) at a site, only "bat friendly" cave/mine gates will be installed. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- BLM will avoid/minimize alterations of clean drinking water and foraging areas by:
  - Protecting potential recharge areas of cave streams and other karst features that are hydrologically connected to known or assumed hibernacula.
  - Setting back equipment servicing and maintenance areas at least 300 feet away from streambeds, sinkholes, fissures, or areas draining into sinkholes, fissures, or other karst or mine features.
  - Following available standards on spill prevention, containment, and control.
  - Restricting use of herbicides for vegetation management near known or assumed Northern Long-Eared Bat hibernacula to those specifically approved for use in karst (e.g., sinkholes) and water (e.g., streams, ponds, lakes, wetlands).
  - Implementing strict adherence to sediment and erosion control measures and reclamation standards. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will avoid disturbing/killing/injuring Northern Long-Eared Bats during spring staging/fall swarming by not clearing occupied spring staging and fall swarming habitat near known Northern Long-Eared Bat hibernacula during the staging and swarming seasons. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will avoid killing or injuring Northern Long-Eared Bats during tree clearing activities by not clearing occupied maternity colony summer habitat during the summer maternity season. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will minimize other direct effects to Northern Long-Eared Bats by not clearing occupied summer habitat during the time of year when females are pregnant or the pups are incapable of flight. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will avoid/minimize altering clean drinking water and foraging areas by:
  - Implementing sediment and erosion control measures and reclamation standards.
  - Siting equipment servicing and maintenance areas at least 300 feet away from waterbodies (e.g., wetlands, streams). Following available standards on spill prevention, containment, and control. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

Impact Analysis and Effects Determination
A summary of the salable mineral resources within the planning area can be found in the Buffalo RMP Revision in Section 3.2.5, the *Salable Minerals* section of Chapter 3. This summary, the proposed management actions, and above Conservation Measures were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – No known populations of Ute ladies'-tresses orchid occur in the planning area. Areas being mined for sand and gravel or clinker would have topsoil removed by heavy equipment in the pit and for access roads. Activity in the mine pit would include using backhoes and dozers to dig out rock, and using separators and crushers to process it. Haul trucks would be utilized to transport the rock out of the pit. No direct effects to this species are

anticipated. Indirect effects to potential habitat may occur, including spread of invasive species, increased human use in the area, and elevated dust levels from mining and transportation may occur. However, all federal actions and authorizations for potential impacts to special status plant species will be reviewed and avoidance and mitigation measures implemented. Management actions in the RMP for special status plants would require that predisturbance flowering season surveys are conducted prior to approving any project or activity that may impact habitat for the orchid. The sale or removal of salable minerals would not be allowed within 0.25 mile of any known populations of the orchid. Implementing management actions associated with salable minerals *may affect, not likely to adversely affect* the Ute ladies'-tresses orchid due to *discountable effects (NLAA-d)*. This determination is based on the absence of Ute ladies'-tresses orchid in the planning area, the unlikely event of populations of Ute ladies'-tresses orchid being discovered in areas with proposed salable minerals, and the application of conservation measures to eliminate the risk of destroying individuals. Conservation measures for riparian/wetland areas would also help to protect yet-to-be discovered populations.

Northern Long-Eared Bat – The Proposed RMP would open most lands with federally owned minerals to development and exploration of salable minerals, including those lands where suitable habitat may be present for northern long-eared bats. There may be overlap of areas with the potential for sand and gravel or clinker mining within forested habitats. Areas being mined for sand and gravel or clinker would have topsoil removed by heavy equipment in the pit and for access roads. Activity in the mine pit would include using backhoes and dozers to dig out rock, and using separators and crushers to process it. Heavy earth moving equipment and crushers typically produce increased dust and loud noise. Haul trucks would be utilized to transport the rock out of the pit. Forested habitat could be removed and individuals roosting near active pits could be disturbed by increased dust and noise. Management actions for special status species will mitigate impacts to northern long-eared bats by requiring clearance surveys prior to approval of projects, siting projects to avoid suitable habitat, prohibiting removal of occupied habitat while bats are present, and implementing timing limitations on activities that may disturb roosting bats; mitigation for surface-disturbing and disruptive activities will be considered and applied on a site-specific level. Even with timing limitations, alteration of habitats and increased human activity could cause the species to avoid developed sites. Implementing management actions for salable minerals resources *may affect, not likely to adversely affect (NLAA-i)* the species due to the application of conservation measures identified to avoid occupied habitat and mitigate impacts to special status species.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Cumulative effects from salable resource operations along river corridors or adjacent to other potential habitat for federally listed species on non-federal lands could occur, which may impact these federally listed or proposed species.

Fire and Fuels Management – Wildfires (Unplanned Ignitions)

Proposed Management Actions for Wildfires

The Proposed RMP proposes the following protections for fire and fuels management that benefit listed or proposed species:

- A resource advisor appropriate to the potentially affected resource will be consulted, or assigned, to all wildland fires that involve or threaten BLM-administered lands. (Fire-3002)

- Prohibit use of retardant or foam within 300 feet of surface water sources consistent with guidelines described in the *Interagency Standards for Fire and Fire Aviation Operations*. (Fire-3004)
- Implement the BLM Emergency Stabilization and Burned Area Rehabilitation standards located in the DOI Interagency Burned Area Emergency Response Guidebook (620 DM 3) and BLM Burned Area Emergency Stabilization and Rehabilitation (ES&R) Handbook as needed. (Fire-3006)
- Maintain and implement the District Fire Management Plan. (Fire-3007)
- Cooperate with and pursue agreements with other agencies and landowners to conduct landscape treatments to achieve enhanced fuels management and/or restoration of fire-adapted ecosystems. (Fire-3009)
- Rehabilitate firelines constructed by heavy equipment, or on steep slopes, to prevent or control erosion. Rehabilitation includes, but is not limited to, water barring and reseeding. (Fire-3010)
- Response to wildland fires varies from full protection in areas where fire is undesirable to monitoring fire behavior in areas where fire can be used as a management tool. (Fire-3011)
- Prohibit heavy equipment use within the following areas, except when human safety is at risk or if the expected fire effects would cause more resource damage than the use of heavy equipment (Fire-3012):
    - Riparian/wetland habitats
    - Identified Greater Sage-Grouse important habitats: Core Population Area and Connectivity Corridor; mapped high quality nesting, brood-rearing, or winter habitat
    - Areas of highly erosive soils
    - Areas with wilderness characteristics
- Limit heavy equipment usage to existing roads and trails, or immediately adjacent to them, in areas not identified as full protection. (Fire-3013)
- Evaluate all fires and rehabilitate, as needed, for suppression and fire-severity impacts. (Fire-3014)
- Use wildland fire and other vegetation treatments to meet vegetation management goals and objectives. (Fire-3015)

Conservation Measures Specific to Wildfire (Unplanned Ignitions)
The following are Conservation Measures, identified in BA Section 9, that may benefit listed or proposed species and are specific to wildfire (unplanned ignitions) management:

- Allow the use of fire suppression chemicals, including foaming agents and surfactants, within areas of known special status plant populations where consistent with the biology of the plant or where human safety or property are at risk. (SS Plants-4006)
- Design post ES&R management to ensure long term persistence of seeded or pre-burn native plants. This may require temporary or long-term changes in livestock grazing and travel

management, etc., to achieve and maintain the desired condition of ES&R projects to benefit sage-grouse (Eiswerth and Shonkwiler 2006). (BLM IM 2012-044)

- Post fire recovery must include establishing adequately sized exclosures (free of livestock grazing) that can be used to assess recovery. (BLM IM 2012-044)
- Mowing of grass will be used in any fuelbreak fuels reduction project (roadsides or other areas). (BLM IM 2012-044)
- Consider potential changes in climate (Miller et al. 2011) when proposing post-fire seedings using native plants. Consider seed collections from the warmer component within a species' current range for selection of native seed (Kramer and Havens 2009). (BLM IM 2012-044)
- Evaluate (e.g., monitor) burned areas for up to three years post-fire and continue management restrictions until the recovering or seeded plant community reflects the desired condition. (BLM National Sage-Grouse Habitat Conservation Strategy)

Impact Analysis and Effects Determination
A summary of the wildfire (unplanned ignitions) resources within the planning area can be found in the Buffalo RMP Revision in Section 3.3.1, the *Unplanned Fire* section of Chapter 3. This summary, the proposed management actions, and above Conservation Measures were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – No known populations of Ute ladies'-tresses orchid occur in the planning area. Actions associated with wildfire suppression could destroy habitats. However, because wildland fires are considered rare events in these habitats, this type of impact is unlikely to occur. Wildfire is not common in Ute ladies'-tresses orchid habitats due to the presence of surface and subsurface water. Wildfire planning is done in advance to determine what kinds of suppression activities will be allowed in a planning unit, where they will be allowed, and what kinds of equipment will be used. Fire plans also identify any special concerns or values that need to be protected, and a resource advisor will be on site to ensure that sensitive resources are avoided when human safety is not at risk. Activities often employ the use of off-road vehicles, hand tools, and heavy equipment such as bulldozers to construct fire lines to contain the fire. Although the likelihood is small, fire suppression activities could affect Ute ladies'-tresses and their habitat. During the filling of water tankers, riparian habitat may be altered or destroyed by tanker truck or human trampling. Plants may be crushed while crews and vehicles access fire lines, however potential loss of habitat or individual plants would probably be extremely limited if the plant were to occur in the area at all. The use of aerial fire retardant is restricted near water resources. If the introduction or spread of noxious weeds occurred, it could adversely affect the orchid and its habitat. Suitable habitat areas typically do not burn frequently because of the presence of nearby surface and subsurface water, and the lack of significant fuel associated with orchid's habitat. Heavy machinery associated with fire suppression and fire prevention could potentially destroy habitat and individuals. Implementing wildfire management actions *may affect, not likely to adversely affect* the Ute ladies'-tresses orchid due to *discountable effects (NLAA-d)*. This determination is based on the extremely limited potential for wildland fires to occur in habitat for the species and the same limited probability that fire equipment would be used in the orchid's habitat. If a wildland fire were to occur within any known habitat for the orchid and immediate suppression is required, as many conservation measures as possible will be applied that do not hinder safety or property protection. The USFWS will be contacted and emergency consultation will take place at the earliest possible time if any known habitat for the orchid is affected or impacted.

Northern Long-Eared Bat – The northern long-eared bat has only been positively identified to occur in northeastern Campbell County. Approximately 18% of potential habitat identified by the USFWS overlays BLM administered surface lands in Campbell County; however, based on the distribution maps provided by WYNDD for the species, the likelihood that all of this habitat would be occupied by the species is minimal. WYNDD's predicted occurrence for the species only includes a small portion of forested habitat in northeast Campbell County. Because one individual bat was captured in the Spring Creek area, it is possible that the forested areas in close proximity to that area may also be occupied. Taking this into consideration, occupied habitat that may be affected is limited. Activities often employ the use of off-road vehicles, hand tools, and heavy equipment such as bulldozers to construct fire lines to contain the fire. Although the likelihood is small, fire suppression activities could affect northern long-eared bat habitat. BLM is typically the lead agency on fires that start on BLM surface, BLM is rarely the first responder to wildfires and therefore cannot control all initial suppression activities. BLM has agreements in place with the counties to guide initial attack, including resource protection strategies. Wildfire planning is done in advance to determine what kinds of suppression activities will be allowed in a planning unit, where they will be allowed, and what kinds of equipment will be used. Fire plans also identify any special concerns or values that need to be protected, and a resource advisor will be on site to ensure that sensitive resources are avoided when human safety is not at risk. Suppression activities in suitable occupied habitats may impact the northern long-eared bat, especially during the initial attack phase of a fire when extinguishing the fire is likely to be the main objective. The use of heavy equipment and other techniques may remove trees suitable for roosting; if an active roost is removed, bats may be disturbed or killed. Areas containing sensitive resources, such as suitable habitat for the bat, will be targeted for special protection, and reinforced through coordination with assigned resource advisors; important habitat will be identified during annual fire management planning with other stakeholders. Implementing wildfire management actions *may affect, likely to adversely affect (LAA)* the species within the planning area. While the risk to occupied habitat may be minimal, it is still possible that roosts could be removed while active, especially during the initial attack phase. The BLM will consider the Northern Long-Eared Bat and other special status species during planning and implementation of suppression activities in occupied habitat.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Buildup of hazardous fuels on private lands could increase the risk of wildland fire in the planning area, potentially directly and indirectly impacting listed or proposed species and their habitats. Individuals may be displaced or killed and suitable habitats may be altered due to suppression activities. Indirect effects include the potential for wildland fire to improve some habitats for listed or proposed species.

Fire and Fuels Management - Prescribed Fires (Planned Ignitions)

Proposed Management Actions for Prescribed Fires
Refer to the Unplanned Fire (Wildfire) section above for management actions for fire and fuels management that benefit listed or proposed species.

Conservation Measures Specific to Prescribed Fire (Planned Ignitions)
The following are Conservation Measures, identified in BA Section 9, that may benefit listed or proposed species and are specific to prescribed fire (planned ignitions) management:

- Prescribed fire and grazing activities shall be coordinated between biologists, rangeland management specialists, and fire personnel to ensure that no damage occurs to the plant habitat

when being used to maintain the habitat for the species. (BLM Wyoming Programmatic Statewide Ute Ladies'-Tresses Orchid BA)

- During fuels management project design, consider the utility of using livestock to strategically reduce fine fuels (Diamond et al. 2009), and implement grazing management that will accomplish this objective (Davies et al. 2011; Launchbaugh et al. 2007). Consult with ecologists to minimize impacts to native perennial grasses. (BLM IM 2012-044)

- Evaluate (e.g., monitor) burned areas for up to three years post-fire and continue management restrictions until the recovering or seeded plant community reflects the desired condition. (BLM National Sage-Grouse Habitat Conservation Strategy)

- Seeding may be required in areas where residual perennial vegetation is insufficient to respond following prescribed burning. (BLM National Sage-Grouse Habitat Conservation Strategy)

- Avoid disturbing/killing/injuring Northern Long-Eared Bats during spring staging/fall swarming. Avoid prescribed burning or other sources of smoke in known or assumed Northern Long-Eared Bat habitat during the swarming/staging or hibernation season, or coordinate with the local USFWS office. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- Avoid killing or injuring Northern Long-Eared Bat during tree clearing activities. Do not clear maternity colony summer habitat during the summer maternity season to avoid direct effects to females (pregnant, lactating, and post-lactating) and juveniles. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- Minimize other direct effects to Northern Long-Eared Bat. During prescribed burns, where the proposed perimeter fire line is constructed by hand, construct it at least two tree-lengths away from any known Northern Long-Eared Bat habitat, or potential roost trees that have been identified. If such trees are adjacent to a fixed part of the fire line such as the road, a trail, or the river, they will have fire line constructed around the bases, so long as their remaining in place does not jeopardize firefighter safety. Whenever possible, conduct prescribed burns outside of the summer maternity season. Burns conducted during the summer maternity season should be low/moderate intensity to minimize direct impacts to Northern Long-Eared Bat. Fire-effects monitoring should be used before, during, and after the burns to ensure that burning conditions and effects are within the desired ranges. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- Maintain summer maternity habitat. Retain and avoid impacting potential roost trees, which includes live or dead trees and snags ≥3 inches diameter at breast height that have exfoliating bark, cracks, crevices, or cavities. Do not remove trees surrounding potential roosts to maintain the microclimate. Where possible and not a safety hazard, leave dead or dying trees standing. Avoid reducing the suitability of forest patches with known Northern Long-Eared Bat use. Clearly demarcate trees to be protected. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

Impact Analysis and Effects Determination

A summary of the prescribed fire (planned ignitions) management within the planning area can be found in the Buffalo RMP Revision in Section 3.3.2, the *Planned Fire* section of Chapter 3. This summary, the proposed management actions, and above Conservation Measures were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – Prescribed fire is not commonly used in Ute ladies'-tresses orchid habitat in the planning area due to the presence of surface and subsurface water and the lack of fuel accumulation in these areas. Actions associated with fuels management could destroy habitats; however, this type of impact is unlikely due to the rare use of prescribed fire in these areas. Management actions in the RMP would require clearance surveys in any suitable habitats prior to the approval of any activity planned in suitable habitat, including prescribed fire. Activities within known populations would not be permitted. Implementing prescribed fire management actions *may affect, not likely to adversely affect* the Ute ladies'-tresses orchid due to *discountable effects (NLAA-d)*. This determination is based on the unlikely event of prescribed fire use in Ute ladies'-tresses orchid habitat.

Northern Long-Eared Bat – The northern long-eared bat has only been positively identified to occur in northeastern Campbell County. Approximately 18% of potential habitat identified by the USFWS overlays BLM administered surface lands in Campbell County; however, based on the distribution maps provided by WYNDD for the species, the likelihood that all of this habitat would be occupied by the species is minimal. WYNDD's predicted occurrence for the species only includes a small portion of forested habitat in northeast Campbell County. Because one individual bat was captured in the Spring Creek area, it is possible that the forested areas in close proximity to that area may also be occupied. Taking this into consideration, occupied habitat that may be affected is limited. Prescribed fire in occupied habitats may impact the northern long-eared bat. Reduction of fuels in forested habitats through prescribed fire could limit the severity of wildfires, and in turn protect habitat from loss. Use of prescribed fire to reduce ladder fuels and fuels treatments that open up the canopy of forested areas may improve habitat for the species (USFWS 2014). Increased light penetration may increase some insect taxa and stimulate vegetation growth in the understory (Loeb and Waldrop 2008). Female bats may prefer to roost in stands where the canopy has been opened up (but not clear cut), which may be due to trees located in more open habitat receiving greater solar radiation and therefore speeding development of young bats (USFWS 2013a). Fire treatments that may remove several acres of forested habitat would not be prescribed in occupied habitats. If activities are planned in suitable habitat, clearance surveys and seasonal timing limitations would be implemented, as well as identification of important habitat components to be conserved such as live or dead trees and snags ≥3 inches diameter at breast height that have exfoliating bark, cracks, crevices, or cavities. Extra precautions to protect important trees would be implemented in areas where understory burns are planned. No potential hibernacula are likely to exist within Campbell County due to the geology, so prescribed burning during spring, fall, and winter are not likely to impact the species, which is only expected to utilize habitat in the planning area for summer roosting. If a hibernaculum were discovered, then conservation measures to protect hibernating bats would be implemented. Implementing prescribed fire management actions *may affect, not likely to adversely affect (NLAA-d)* the species within the planning area, due to the unlikelihood that activities would occur in occupied habitat or remove large areas of trees, application of conservation measures, and the potential improvement and protection of suitable habitat.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Prescribed fire on non-federal lands could reduce hazardous fuel loads and, therefore, the risk of catastrophic wildland fire, as well as improve habitat for listed or proposed species. Such impacts are anticipated to be minimal.

Vegetation - Forests and Woodlands

Proposed Management Actions for Forests and Woodlands
The Proposed RMP proposes the following protections for forest and woodlands that benefit listed or proposed species:

- Design and implement silvicultural treatments to maximize forest health. (Forest-4001)
- Utilize intensive management tactics to manage for desired forest/woodland health (HFRA) and to reduce or circumvent events such as insects, disease, and wildfire. (Fire-4002)
- Manage forests/woodlands to emphasize multiple resource values. (Forest-4004)
- Actively manage woodlands to prevent expansion into other communities consistent with multiple resource values, on a project specific basis. (Forest-4006)

Conservation Measures Specific to Forests and Woodlands
Conservation Measures, identified in BA Section 9, that may benefit listed or proposed species and which are specific to forest and woodland resource management are as follows:

- BLM will avoid disturbing/killing/injuring Northern Long-Eared Bats during spring staging/fall swarming by:
    - not clearing occupied spring staging and fall swarming habitat near known Northern Long-Eared Bat hibernacula during the staging and swarming seasons. Surveys will be conducted to determine occupancy prior to any tree clearing activities.
    - avoiding planned fire or other sources of smoke in known Northern Long-Eared Bat habitat during the swarming/staging or hibernation season, or coordinate with the USFWS. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will avoid killing or injuring Northern Long-Eared Bats during tree clearing activities by not clearing occupied maternity colony summer habitat during the summer maternity season. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will minimize other direct effects to Northern Long-Eared Bats by not clearing occupied summer habitat during the time of year when females are pregnant or the pups are incapable of flight. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will maintain summer maternity habitat by:
    - Retaining known roost trees, which includes live or dead trees and snags ≥3 inches diameter at breast height that have exfoliating bark, cracks, crevices, or cavities. Surveys will be conducted to determine occupancy prior to any tree clearing activities.
    - Clearly demarcating trees to be protected vs. cut to help ensure that contractors do not accidentally remove more trees than anticipated. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- Avoid timber harvest activities in areas close to known roosting sites of northern myotis (*Myotis septentrionalis*) during the maternity roosting period, and retain all known roost trees (Schmidt 2003). Use patch cuts and selective harvesting to provide regenerating forest and

retain large-diameter snags (Lacki and Schwierjohann 2001). (A Conservation Plan for Bats in Wyoming)

- Retain all large-diameter snags, particularly those greater than 21 centimeters (8 inches) diameter at breast height (Schmidt 2003), as potential roost sites for northern myotis (*Myotis septentrionalis*) and other snag-dependent species. Provide large-diameter snags in early states of decay, particularly snags with large amounts of exfoliating bark (Lacki and Schwierjohann 2001). Retain mature and decadent trees for future snag production, particularly where existing snags are few. Because the northern myotis switches tree roosts frequently and may need several suitable roosts over the course of a summer (Foster and Kurta 1999; Caceres and Barclay 2000), it is necessary to retain all snags in areas where bats are known to roost. (A Conservation Plan for Bats in Wyoming)

Impact Analysis and Effects Determination
A summary of the forest and woodlands resources within the planning area can be found in the Buffalo RMP Revision in Section 3.4.1, the *Vegetation – Forest and Woodlands* section in Chapter 3. This summary, the proposed management actions, and above Conservation Measures were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – The Ute ladies'-tresses orchid is associated with riparian areas, which are not typically targeted for forest and woodland management. Potential Ute ladies'-tresses orchid habitats are not expected to experience any effects from forest and woodland management actions. Implementing forest and woodland management actions has *no effect (NE)* on the Ute ladies'-tresses orchid. This determination is based on the absence of forest and woodland management actions occurring in Ute ladies'-tresses orchid potential habitats.

Northern Long-Eared Bat – Forested habitats in Campbell County may provide suitable habitat to the northern long-eared bat in the planning area. The northern long-eared bat has only been positively identified to occur in northeastern Campbell County. Approximately 18% of potential habitat identified by the USFWS overlays BLM administered surface lands in Campbell County; however, based on the distribution maps provided by WYNDD for the species, the likelihood that all of this habitat would be occupied by the species is minimal. WYNDD's predicted occurrence for the species only includes a small portion of forested habitat in northeast Campbell County. Because one individual bat was captured in the Spring Creek area, it is possible that the forested areas in close proximity to that area may also be occupied. Taking this into consideration, occupied habitat that may be affected is limited. Managing forests and woodlands to maximize forest health and emphasize multiple resource values, such as healthy wildlife habitat, is a benefit to the species. Management that reduces the threats of wildfire, disease, and insect damage would in turn reduce the threat of habitat loss. The primary mechanism for carrying out forest and woodlands management is expected to be removal of trees through mechanical methods such as cutting. Thinning is expected to be the most common treatment to address forest health issues, and clear cutting is not anticipated to occur. Thinned trees would be laid on the ground where they fall to decay, moved into slash piles that may be burned at a later date, or girdled but not felled to provide potential roost sites, depending on site-specific conditions. Actions that open up the canopy of forested areas may improve habitat for the species (USFWS 2014). Increased light penetration may increase some insect taxa and stimulate vegetation growth in the understory (Loeb and Waldrop 2008). Female bats may prefer to roost in stands where the canopy has been opened up (but not clear cut), which may be due to trees located in more open habitat receiving greater solar radiation and therefore speeding development of young bats (USFWS 2013a). If activities are planned in suitable habitat, clearance surveys to determine occupancy and seasonal

timing limitations on removal of trees in occupied habitat would be implemented, as well as identification of important habitat components to be conserved such as live or dead trees and snags ≥3 inches diameter at breast height that have exfoliating bark, cracks, crevices, or cavities. Removal of trees during the summer roosting season would not be permitted in occupied habitat. Implementing forest and woodland management actions *may affect, not likely to adversely affect (NLAA-i)* the species within the planning area, but effects are likely to be mostly beneficial due to potential improvement and protection of suitable habitat.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Forest and woodland management on non-federal lands could affect listed or proposed species and potential habitats. Individuals may be displaced or killed and suitable habitats may be lost or altered due to activities. Road building, related to commercial operations, may affect suitable habitats.

Vegetation - Grassland and Shrubland Communities

Proposed Management Actions for Grassland and Shrubland Communities
The Proposed RMP proposes the following protections for grassland and shrubland communities that benefit listed or proposed species:

- Manage vegetative communities in accordance with *Wyoming Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for the Public Lands Administered by the BLM in the State of Wyoming.* (GS-4001)
- Complete vegetation inventories in coordination with stakeholders. (GS-4002)
- Use an integrated management approach (e.g., mechanical, chemical, biological treatments, prescribed fire, and grazing management techniques) to maintain, restore, and enhance the health and diversity of plant communities to achieve resource or multi-resource objectives. (GS-4003)
- Maintain sustainable forage levels for livestock and wildlife habitats. (GS-4004)
- Manage grasslands and shrublands to protect, preserve, or enhance plant communities. (GS-4005)
- Manage the siting of facilities and related infrastructure (utility corridors, roads) to reduce impacts to vegetation resources. (GS-4006)
- Manage the planning and development of travel routes, recreational uses, mineral exploration and development sites, and ROW to reduce impacts to the vegetation resource. (GS-4007)
- Develop a contingency plan addressing catastrophic natural events such as drought, wildfires, and large-scale pest infestations, incorporating strategies that best protect vegetation resources. (GS-4008)
- Work with landowners on split estate lands to reestablish disturbed sites to healthy plant communities in accordance with the ecological site potential. (GS-4009)
- Allow desirable non-native plant species for short-term reclamation activities as a component in an authorized reclamation plan followed with planting of native species. (GS-4010)

Conservation Measures Specific to Grassland and Shrubland Communities
The following are Conservation Measures, identified in BA Section 9, that may benefit listed or proposed species and are specific to grassland and shrubland resource management:

- The BLM will ensure that upland vegetation on each ecological site consists of plant communities appropriate to the site which are resilient, diverse, and able to recover from natural and human disturbance. (BLM Wyoming Programmatic Statewide Ute Ladies'-Tresses Orchid BA)

- The BLM will ensure that 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 species, endangered species, species of special concern, or sensitive species will be maintained or enhanced. (BLM Wyoming Programmatic Statewide Ute Ladies'-Tresses Orchid BA)

- Design post restoration management to ensure long term persistence. This could include changes to livestock grazing management and travel management, etc., to achieve and maintain the desired condition of the restoration effort that benefits sage-grouse (Eiswerth and Shonkwiler 2006). (BLM IM 2012-044)

- Consider potential changes in climate (Miller et al. 2011) when proposing restoration seedings using native plants. Consider collection from a warmer component of the species current range when selecting native species (Kramer and Havens 2009). (BLM IM 2012-044)

Impact Analysis and Effects Determination
A summary of the grassland and shrubland resources within the planning area can be found in the Buffalo RMP Revision in Section 3.4.2, the *Vegetation – Grassland and Shrubland Communities* section in Chapter 3. This summary, the proposed management actions, and above Conservation Measures were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – Management actions of grassland and shrubland communities are not expected to adversely impact the Ute ladies'-tresses orchid. Implementing grassland and shrubland management actions will have *no effect (NE)* on the Ute ladies'-tresses orchid, as the species does not occur in these habitats. This determination is based on the existing conservation measures in place to protect individual plants and habitats, the absence of the species in the planning area, and that this species does not occur in grassland and shrubland habitats.

Northern Long-Eared Bat – Management actions of grassland and shrubland communities are not expected to impact the northern long-eared bat. Implementing grassland and shrubland management actions will have *no effect (NE)* on the northern long-eared bat, as the species does not roost in these habitats.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Management on non-federal lands may add to disturbance of listed or proposed species. Depending on the time of year actions are conducted, increased human presence and use of machinery may cause detrimental impacts to listed or proposed species. If actions on BLM-administered and non-federal lands occur during the same time period and in nearby locations, habitat for listed or proposed species could be limited.

Vegetation - Riparian/Wetland Resources

Proposed Management Actions for Riparian/Wetland Resources
The Proposed RMP proposes the following protections for riparian/wetland resources that benefit listed or proposed species:

- Inventory lotic and lentic riparian/wetland systems. (Riparian-4001)
- Prioritize, and develop activity and implementation plans to manage riparian systems to be at or above, or continue to be improving toward, proper functioning condition while achieving the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for the Public Lands Administered by the BLM in the State of Wyoming.* (Riparian-4002)
- Manage riparian and wetland systems to enhance forage conditions and improve water quality. Manage all riparian systems with sensitive species concerns to a succession stage appropriate for that system, including vertical as well as horizontal vegetative structure and composition. (Riparian-4003)
- Expand and enhance riparian/wetland systems and habitat in cooperation with stakeholders. (Riparian-4004)
- Prevent degradation, loss, or destruction of riparian/wetland habitat. (Riparian-4005)
- Prohibit conflicting uses within riparian research areas and special exclosures, such as waterfowl reservoirs and wetland systems on springs and streams. (Riparian-4006)
- Evaluate CBNG created riparian and wetland systems for retention or reclamation. (Riparian-4007)
- Allow surface disturbance within 500 feet of riparian/wetlands systems, and aquatic habitats based on resource objectives including, but not limited to soil, slope, and vegetation. (Riparian-4008)
- Apply a CSU stipulation to any mineral lease within 500 feet of riparian/wetlands systems, and aquatic habitats based on other resource values. (Riparian-4009)
- Identify and manage systems capable of achieving Desired Functioning Condition (DFC). (Riparian-4010)
- Restore vegetation in CBNG supported wetland and riparian systems on BLM surface and/or lease in accordance with the ecological site potential. (Riparian-4011)
- Restore Greater Sage-Grouse brood-rearing habitats in riparian/wetland areas. Maintain seeps, springs, wet meadows, and riparian vegetation in a functional and diverse condition for young Greater Sage-Grouse and other species that depend on forbs and insects associated with these areas. (SS WL-4012)

Conservation Measures Specific to Riparian/Wetland Resources
The following are Conservation Measures, identified in BA Section 9, that may benefit listed or proposed species and are specific to riparian/wetland resource management:

- In any proposed new access, wetland and riparian areas will be avoided where possible. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- The BLM will manage stream habitats to retain, re-create, or mimic natural hydrology, water quality, and related vegetation dynamics. Projects that may alter natural hydrology or water quality change the vegetation of the riparian ecosystem and cause direct ground disturbance will be evaluated and redesigned to ensure that adverse effects to populations of the Ute ladies'-tresses orchid do not occur. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- If revegetation projects are conducted within 0.25 miles of known habitat for the orchid, only native species will be selected. This conservation measure will reduce the possibility that non-native species will be introduced and will compete with Ute ladies'-tresses orchid. (BLM Wyoming Statewide Ute Ladies'-Tresses Orchid BA)

- Maintain and restore the natural species composition and structural diversity of plant communities in riparian zones and wetlands. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- For the protection of the Ute ladies'-tresses orchid and its potential habitat, surface-disturbing activities should be avoided in the following areas when they occur outside the protective 0.25-mile buffer from populations of the Ute ladies'-tresses orchid: (a) identified 100-year flood plains, (b) areas within 500 feet from perennial waters, springs, wells, and wetlands, and (c) areas within 100 feet of the inner gorge of ephemeral channels. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Design post restoration management to ensure long term persistence. This could include changes to livestock grazing management and travel management, etc., to achieve and maintain the desired condition of the restoration effort that benefits sage-grouse (Eiswerth and Shonkwiler 2006). (BLM IM 2012-044)

- Consider potential changes in climate (Miller et al. 2011) when proposing restoration seedings using native plants. Consider collection from a warmer component of the species current range when selecting native species (Kramer and Havens 2009). (BLM IM 2012-044)

- Maintain seeps, springs, wet meadows, and riparian vegetation in a functional and diverse condition for young Greater Sage-Grouse and other species that depend on forbs and insects associated with these areas. (BLM National Sage-Grouse Habitat Conservation Strategy)

- Restore lost riparian and wetland plant species diversity and structure by replanting appropriate species near crucial Greater Sage-Grouse habitat. (BLM National Sage-Grouse Habitat Conservation Strategy)

- Treatments should be designed to improve a deficient condition within the community (e.g., poor cover of herbaceous understory). (BLM National Sage-Grouse Habitat Conservation Strategy)

- BLM will avoid/minimize alterations of clean drinking water and foraging areas by:

    - Protecting potential recharge areas of cave streams and other karst features that are hydrologically connected to known or assumed hibernacula.

    - Setting back equipment servicing and maintenance areas at least 300 feet away from streambeds, sinkholes, fissures, or areas draining into sinkholes, fissures, or other karst or mine features.

- Following available standards on spill prevention, containment, and control.
- Restricting use of herbicides for vegetation management near known or assumed Northern Long-Eared Bat hibernacula to those specifically approved for use in karst (e.g., sinkholes) and water (e.g., streams, ponds, lakes, wetlands).
- Implementing strict adherence to sediment and erosion control measures and reclamation standards. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

Impact Analysis and Effects Determination
A summary of the riparian/wetland resources within the planning area can be found in the Buffalo RMP Revision in Section 3.4.3, the *Vegetation – Riparian/Wetland Resources* section of Chapter 3. This summary, the proposed management actions, and above Conservation Measures were taken into consideration for the impact analysis and effects determinations.

Ute-Ladies'-Tresses Orchid – BLM's goal for riparian and wetland management is to promote the health and functional capabilities of riparian and wetland systems (Table 2.17). A few of the management actions include: developing activity and implementation plans to manage riparian systems to be at or above Properly Functioning Condition … (Riparian-4002); managing riparian systems with sensitive species concerns to a succession state appropriate for that system, including vertical as well as horizontal vegetative structure and composition (Riparian-4003); expanding and enhancing riparian/wetland systems and habitat (Riparian-4004); and preventing the degradation, loss, or destruction of riparian/wetland habitat (Riprian-4005). BLM's riparian and wetland goal would improve potential habitat for the Ute ladies'-tresses orchid by improving the riparian and wetland habitat conditions, on which the species depends.

The WYNDD potential distribution model (Heidel 2007) indicates the orchid is most likely to occur in southwestern Campbell County. Due to BLM's multiple use mandate, a limited amount of surface disturbance will likely be authorized within riparian and wetland areas during the planning period for individual land use activities (i.e., fluid minerals, travel and transportation management, locatable minerals, etc.) which are each addressed within their own section. Management action Riparian-4008 allows surface disturbance within 500 feet of riparian/wetlands systems, and aquatic habitats based on resource objectives including, but not limited to soil, slope, and vegetation. To ensure resource objectives are met, which includes promoting the health and functional capabilities of riparian and wetland systems, the management actions within the Buffalo RMP and conservation measures within the RMP's BA will be applied. A minimum of two years of flowering season surveys will be conducted prior to authorizing a riparian or wetland management project within suitable orchid habitat. BLM will consult with the Service on any riparian enhancements proposed within suitable orchid habitat.

The goal of the riparian/wetland resource management actions is to promote the health and functional capabilities of riparian and wetland systems, which would benefit the Ute ladies'-tresses orchid. Riparian and wetland enhancement projects, while of long-term benefit, could have short-term adverse effects. For example, a stream and riparian enhancement project designed to increase the number and depth of in-stream pools and raise the water table by constructing a rock or log check dam. Check dams are small dams which lower the speed of water flow and tend to form stream pools, which allows water to infiltrate into the ground raising the water table. Under high flow (flood) conditions, water flows over or through the structure. Coarse and medium-grained sediment from runoff tends to be deposited behind check dams, while finer grains are usually allowed through. Extra nutrients, phosphorus, nitrogen, heavy metals, and floating garbage are also trapped or eliminated by the presence of check dams, increasing their

effectiveness as water quality control measures. Heavy equipment and human labor would be used in check dam construction which would result in local surface and vegetation disturbance around the dam location. An undocumented orchid population could be harmed by the action; the potential will be reduced through the survey commitment. The above example could potentially be proposed near a known orchid population for its long-term benefits to the species in which case the enhancement construction would occur outside of the flowering season.

Implementing riparian/wetland resource management actions *may affect, likely to adversely affect* the Ute ladies'-tresses orchid (LAA). This determination is based on potential short-term adverse effects to the Ute ladies'-tresses orchid while enhancing the riparian/wetland habitat upon which the species depends.

Northern Long-Eared Bat – Forested habitats in Campbell County may provide suitable habitat to the northern long-eared bat in the planning area. The northern long-eared bat has only been positively identified to occur in northeastern Campbell County. Approximately 6% of potential habitat identified by the USFWS overlays riparian habitats on BLM-administered surface lands in Campbell County; however, based on the distribution maps provided by WYNDD for the species, the likelihood that all of this habitat would be occupied by the species is minimal. WYNDD's predicted occurrence for the species only includes a small portion of forested habitat in northeast Campbell County. Because one individual bat was captured in the Spring Creek area, it is possible that the forested areas in close proximity to that area may also be occupied. Taking this into consideration, occupied habitat that may be affected is extremely limited. Resource activities (i.e., fluid minerals) authorized with potential impacts to the bat are addressed within their own sections. Riparian area management is not likely to have detrimental effects on the bat or its habitat. The management actions related to riparian/wetland resource management will work to protect and improve habitat conditions for northern long-eared bat. The species is likely to utilize riparian and wetland habitats near suitable roosting habitat as sources for water and foraging. Actions taken to improve water quality and promote the proper functioning condition of naturally occurring waters are a benefit to the species. Therefore, implementing riparian/wetland resource management actions *may affect, not likely to adversely affect (NLAA-b)* the species within the planning area, due to beneficial effects.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Protection and enhancement of riparian/wetland resources on non-federal land in the planning area will improve habitat for listed or proposed species. Adverse impacts are not anticipated to occur to listed or proposed species in the long-term.

Invasive Species and Pest Management

Proposed Management Actions for Invasive Species and Pest Management
The Proposed RMP proposes the following protections for invasive species that benefit listed or proposed species:

- Manage designated pests on public surface lands using an *Integrated Pest Management Approach* consistent with DOI Manual 517. (Pest-4001)

- Manage designated pests on public surface lands using an Integrated Pest Management Approach consistent with DOI Manual 517 (BLM 2007f). (Pest-4002)

- Limit surface disturbance to the minimum needed for safe project completion to limit the spread of noxious weeds. (Pest-4003)

- Use certified noxious weed seed-free vegetation products on all BLM-administered projects and lands. (Pest-4004)

- Implement and maintain cooperative integrated pest management programs with county weed and pest districts, state agencies, private industry, grazing lessees, and other stakeholders in conjunction with BLM weed and pest control work on public lands adjoining deeded and state lands. (Pest-4005)

- Require surface or vegetation disturbance areas, including areas formerly receiving or holding water, be treated for invasive species and revegetated. (Pest-4006)

- Treat those plants on the State of Wyoming Designated list, the appropriate county lists, and other species of concern as determined by BLM resource specialists. Priority treatments are those areas where infestations on private land are threatening public lands. (Pest-4009)

- Designate and prioritize areas for the treatment of annual brome species. (Pest-4010)

Conservation Measures Specific to Invasive Species and Pest Management
The following are Conservation Measures, identified in BA Section 9, that may benefit listed or proposed species and are specific to invasive species and pest management:

- Allow aerial application of narrow spectrum herbicide treatments within areas containing special status plant species. (SS Plants-4005)

- Biological control of noxious plant species will be prohibited within 1.0 mile from known Ute ladies'-tresses orchid habitat until the impact of the control agent has been fully evaluated and determined not to adversely affect the plant population. The BLM will monitor biological control vectors. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Except in cases of extreme ecological health (insect or weed outbreaks/infestations), herbicide treatment of noxious plants/weeds will be prohibited within 0.25 mile of known populations of the Ute ladies'-tresses orchid unless it is a narrow spectrum herbicide that would not harm the Ute ladies'-tresses orchid (herbicides specific to dicots) and insecticide/pesticide treatments will be prohibited within 1.0 mile of known populations of the orchid to protect pollinators.

  Where insect or weed outbreaks have the potential to degrade area ecological health inside the buffers listed above, at the discretion of the BLM's authorized officer and with concurrence by the USFWS, the following will apply: where needed, and only on a case-by-case basis, a pesticide use proposal or other site specific plan will address concerns of proper timing, methods of use, and chemicals. Pesticides specifics to dicots will be preferred where these are adequate to control the noxious weeds present.

  Aerial application of herbicides will be carefully planned to prevent drift in areas near known populations of the orchid (outside of the 0.25 mile buffer). The BLM will work with the Animal and Plant Health Inspection Service (APHIS), the USFWS and County Weed and Pest Agencies to select pesticides and methods of application that will most effectively manage the infestation and least affect the orchid. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA) **Note**: The conservation measure was modified from the

programmatic BA measure to allow the use of narrow spectrum herbicides when it has been determined that they would not harm the Ute ladies'-tresses orchid.

- The Service recommends that the Bureau monitor and manage invasive species so these do not impact the Ute ladies'-tresses orchid or its habitat. (USFWS Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BO)

- The Service recommends that the Bureau not authorize herbicide use in known or occupied Ute ladies'-tresses habitat without prior review by Service biologists. (USFWS Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BO)

- Restore small areas dominated by invasive species with desirable vegetation to minimize fragmentation of habitat. (BLM National Sage-Grouse Habitat Conservation Strategy)

- BLM will minimize the spread of WNS. If a cave or mine that could harbor hibernating bats must be entered, and it does not have a cave and mine closure policy, BLM will follow approved WNS decontamination protocols. Under no circumstances will clothing, footwear, or equipment that was used in a WNS-affected state or region be used. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- Restrict use of herbicides for vegetation management near known Northern Long-Eared Bat hibernacula to those specifically approved for use in karst (e.g., sinkholes) and water (e.g., streams, ponds, lakes, wetlands). Minimize use of herbicides and pesticides. If necessary, spot treatment is preferred over aerial application. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- BLM will avoid/minimize altering clean drinking water and foraging areas by minimizing use of herbicides and pesticides. If necessary, spot treatment is preferred over aerial application. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- Avoid or minimize pesticide use in areas where *Myotis septentrionalis* is known to occur to avoid direct poisoning and to maintain a food source for this species and other insectivores. Where possible, allow insect outbreaks to proceed naturally. (A Conservation Plan for Bats in Wyoming)

Impact Analysis and Effects Determination

A summary of the invasive species and pest management within the planning area can be found in the Buffalo RMP Revision in Section 3.4.4, the *Invasive Species and Pest Management* section in Chapter 3. This summary, the proposed management actions, and above Conservation Measures were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – No known populations of the Ute ladies'-tresses orchid are known to occur in the planning area. The BLM employs biological, chemical, and mechanical actions to manage invasive species. Invasive species control measures would be limited in suitable habitat for the orchid. Application of herbicides that could potentially harm the orchid would not be utilized within 0.25 mile of known populations. Aerial herbicide applications, outside of the 0.25 mile buffer, will be carefully planned to prevent drift. Narrow spectrum herbicides are herbicides designed to target specific weeds and applied in accordance with label-specific conditions and therefore would not affect the Ute ladies'-tresses orchid. Clearance surveys would be required prior to application of any treatments in suitable habitats. The BLM would consult with the USFWS on proposed herbicide use within suitable orchid habitat. If either the BLM

or the Service has any concerns that the orchid could be adversely affected, then the treatment would be redesigned to avoid the impact or would not be authorized except in cases of extreme ecological health concern. The WYNDD potential distribution model indicates potential habitat is predominantly limited to southwestern Campbell County (Heidel 2007).

In areas where habitats are unsuitable for the Ute ladies'-tresses orchid because of invasive species, invasive species control measures may benefit the Ute ladies'-tresses orchid by improving those habitats.

Implementing invasive species and pest control management actions *may affect, not likely to adversely affect* the Ute ladies'-tresses orchid due to discountable effects (NLAA-d). This determination is based on the pesticide use restrictions, the conservation measures for the Ute ladies'-tresses orchid, the current absence of the species within the planning area, and the limited potential habitat.

Northern Long-Eared Bat – Invasive species are controlled on BLM surface through cooperative agreements with the counties and Pest Control Districts. In addition, the BFO works in cooperation with the WGFD, State Lands Division, State Parks, local NRCS offices, and private landowners to address invasive species. The BLM typically employs biological, chemical, and mechanical actions to manage invasive species. Trees are unlikely to be removed through the invasive species program. Control of invasive species on BLM surface lands could improve habitats for the northern long-eared bat by improving and protecting habitat conditions. Pesticide applications in forested habitats during the spring and summer could impact bats; however, occupied habitat in the planning area is limited, and the likelihood that management actions will affect the species is minimal. Pesticides are typically only used in areas with Mormon cricket or grasshopper infestations, and not likely to occur in forested habitats where the bat is expected to forage. Silviculture treatments are expected to be the primary technique to protect areas infested with pine beetle, as there are currently no chemicals authorized to treat the species, silvicultural treatments are analyzed in the Forest and Woodlands section of this BA. Clearance surveys would be required prior to activities proposed in potential habitat, and activities would be timed to occur when bats were not present. Although no potential hibernacula are present within Campbell County, caves will be managed to prevent the spread of white-nosed syndrome. Therefore, implementing invasive species management actions *may affect, not likely to adversely affect (NLAA-i)* the species within the planning area, due to insignificant effects. This determination is based on the unlikelihood that invasive species management actions will occur in occupied habitat, and the application of conservation measures to avoid impacts to the species.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Surface-disturbing activities and soil disturbance contribute to the spread of invasive species. While much of the surface disturbance from non-BLM actions is anticipated to be reclaimed, the potential for spread of invasive species remains from both short-term and long-term impacts. Surface disturbance is anticipated to continue on non-federal lands. The spread of invasive species could affect listed or proposed species habitats, making them unsuitable. The long-term effectiveness of invasive species 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 actions in accordance with a comprehensive weed management plan. Unchecked invasive species could overwhelm attempts at control and substantially impact fire and fuels management, biological resources, livestock grazing management (by reducing rangeland

productivity and animal unit months), and recreation (by impacting wildlife habitats and scenic quality) throughout the planning area.

Fish and Wildlife Resources

Proposed Management Actions for Fish and Wildlife Resources
The Proposed RMP proposes the following protections for fish and wildlife resources that benefit listed or proposed species:

Fish

- Develop appropriate mitigation for surface-disturbing and disruptive activities associated with fish management through use of the mitigation guidelines. (Fish-4001)
- Manage harmful non-native riparian vegetation in river and stream systems important to fish species in cooperation with the WGFD and other stakeholders. (Fish-4005)
- Maintain or enhance streams and riparian areas associated with Class I and II streams, Powder River, Tongue River, and other appropriate areas for desired fisheries potential. (Fish-4008)
- Maintain or enhance fish habitat with actions affecting perennial waters consistent with other resource values. (Fish-4010)
- Identify and manage fish habitat capable of achieving DFC. Manage all other areas with fish habitat to meet PFC. (Fish-4011)
- Allow surface-disturbing activities within 0.25 mile of naturally occurring water bodies containing native or desirable non-native fish species where fish can be adequately protected. (Fish-4012)
- Apply a CSU stipulation within 0.25 mile of naturally occurring water bodies containing native and desirable non-native fish species. (Fish-4013)
- Perform restoration of important in-stream segments for fish habitat in accordance with WGFD priorities. (Fish-4015)

Wildlife

- Develop appropriate mitigation for surface-disturbing and disruptive activities associated with wildlife habitat management through use of the mitigation guidelines. (WL-4001)
- Maintain or improve important wildlife habitats through vegetative manipulations, habitat improvement projects, livestock grazing strategies and the application of The Wyoming Guidelines for Managing Sagebrush Communities with Emphasis on Fire Management (Wyoming Interagency Vegetation Committee 2002), WGFD Strategic Habitat Plan, State Wildlife Action Plan (SWAP), and similar guidance updated over time. (WL-4002)
- Continue to use existing HMPs and update as necessary to include management objectives and prescriptions for wildlife: South Big Horns HMP, including a portion or all of the Gardner Mountain and North Fork WSAs; Wetlands HMP; and Middle Fork Powder River HMP. (WL-4003)

- Consult with the WGFD, in accordance with the MOU, when applying mitigation for wildlife and before waiving, allowing exceptions to, or modifying wildlife-related land use restrictions and mitigation. (WL-4005)

- Provide, to the extent possible, suitable habitat and forage to support wildlife population objectives as defined by WGFD. The BLM will cooperatively consider proposals by the WGFD to change population objective levels based on habitat capability and availability. (WL-4006)

- Manage access to protect crucial habitats in cooperation with WGFD and other stakeholders. (WL-4007)

- Utilize current research, management and conservation plans, and similar related documents to guide wildlife habitat management. (WL-4008)

- Promote the maintenance and improvement of habitat for migratory bird species of conservation concern in a manner consistent with national, regional, and statewide bird conservation priorities. (WL-4011)

- Prohibit commercial renewable energy (wind and solar) projects in big game crucial winter range, elk calving areas, and identified big game priority travel corridors. (WL-4024)

- Prohibit surface-disturbing, disruptive activities, or surface occupancy within USFWS recommended spatial buffers or seasonal dates for active raptor nests. Apply CSU and TLS to new fluid mineral leases. (WL-4027, WL-4028, WL-4029, WL-4030)

Conservation Measures Specific to Fish and Wildlife Resources
The following Conservation Measures, identified in BA Section 9, may benefit listed or proposed species and are specific to fish and wildlife resource management:

- The BLM will maintain biological diversity of plant and animal species; support the WGFD strategic plan population objective levels to the extent practical and to the extent consistent with BLM multiple use management requirements; maintain, and where possible, improve forage production and quality of rangelands, fisheries, and wildlife habitat; and to the extent possible, provide habitat for threatened and endangered and special status plant and animal species on all public lands in compliance with the ESA and approved recovery plans. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- The BLM will manage stream habitats to retain, re-create, or mimic natural hydrology, water quality, and related vegetation dynamics. Projects that may alter natural hydrology or water quality, change the vegetation of the riparian ecosystem and cause direct ground disturbance will be evaluated and redesigned to ensure that adverse effects to populations of the orchid do not occur. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- BLM will avoid disturbing/killing/injuring Northern Long-Eared Bats during spring staging/fall swarming by not clearing occupied spring staging and fall swarming habitat near known Northern Long-Eared Bat hibernacula during the staging and swarming seasons. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- BLM will maintain summer maternity habitat by:

- Retaining known roost trees, which includes live or dead trees and snags ≥3 inches diameter at breast height that have exfoliating bark, cracks, crevices, or cavities. Surveys will be conducted to determine occupancy prior to any tree clearing activities.

- Clearly demarcating trees to be protected vs. cut to help ensure that contractors do not accidentally remove more trees than anticipated. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

Impact Analysis and Effects Determination
A summary of the fish and wildlife resources within the planning area can be found in the Buffalo RMP Revision in Section 3.4.5, the *Fish and Wildlife Resources – Fish* and 3.4.6, *Fish and Wildlife Resources – Wildlife* sections in Chapter 3. This summary, the proposed management actions, and above Conservation Measures were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – Fish and wildlife management actions will improve habitat for the Ute ladies'-tresses orchid by maintaining or improving riparian and wetland habitat conditions, on which the species depends. Implementing fish and wildlife resource management actions *may affect, not likely to adversely affect* the Ute ladies'-tresses orchid due to *beneficial effects (NLAA-b)*. This determination is based on the potential for improvement of habitat.

Northern Long-Eared Bat – Management actions for fish and wildlife are centered around species protections and habitat improvements. Fish and wildlife resource management actions will protect and improve northern long-eared bat habitat; especially those which occur in forested or riparian areas in northern Campbell County. Timing limitations and disturbance free buffers that overlap with occupied habitat will also protect bats utilizing the protected habitat. Fish and wildlife habitat enhancements would not occur within occupied northern long-eared bat habitat. Suitable habitat would be surveyed prior to any enhancement activities; any projects planned for occupied habitat would be postponed until northern long-eared bats are not present. Implementing fish and wildlife resource management actions *may affect, not likely adversely affect (NLAA-b)* the species within the planning area, due to the beneficial effects of habitat protection and improvement, and protections of individuals.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Fish and wildlife management actions on non-federal lands may result in temporary impacts to listed or proposed species, but are anticipated to benefit listed and proposed species overall through habitat improvements.

Special Status Species – Plants

Proposed Management Actions for Special Status Species - Plants
The Proposed RMP proposes the following protections for special status species – plants resources that benefit listed or proposed species:

- Implement actions set forth in recovery plans, conservation measures, terms and conditions, and appropriate BMPs and reasonable and prudent measures within BOs for Threatened and/or Endangered plant species. (SS Plants-4001)

- Allow treatments within habitat for special status plant species and within known populations that are proven to benefit the species. (SS Plants-4002)

- Allow the following within habitat for special status plant species, though not within known populations (SS Plants-4003):
  - Surface-disturbing activities that could adversely impact special status plant species.
  - Mineral exploration and development activities.
  - All motor vehicle use, including uses related to fire suppression and geophysical exploration activities (surveying, etc.).
  - Use of explosives and blasting.
  - Placement of water developments, salt and mineral supplements.
  - After survey establish site-specific botanic buffer.
- Require predisturbance flowering season surveys for special status plant species prior to approving any project or activity that may impact the habitat for these species. (SS Plants-4004)
- Allow aerial application of narrow spectrum herbicide treatments within areas containing special status plant species. (SS Plants-4005)
- Allow the use of fire suppression chemicals, including foaming agents and surfactants, within areas of known special status plant populations where consistent with the biology of the plant or where human safety or property are at risk. (SS Plants-4006)
- Allow ROWs within areas containing habitat for special status species plants, though not within areas of known populations. (SS Plants-4007)
- Apply a CSU stipulation to mineral leases within habitat for special status plant species. (SS Plants-4008)
- Manage livestock grazing to protect special status plant populations (exclosures, timing). (SS Plants-4009)

Conservation Measures Specific to Special Status Species - Plants Resources
The following are Conservation Measures, identified in BA Section 9, that may benefit listed or proposed species and are specific to special status species - plants resource management:

- Maintain (size and quality) or enhance current habitat utilized by special status species. Enlarge/restore habitat on site specific basis. (SS WL-4013)
- Manage surface-disturbing and disruptive activities to mitigate impacts on special status wildlife species and their habitats. (SS WL-4006)
- The BLM will maintain biological diversity of plant and animal species; support the WGFD strategic plan population objective levels to the extent practical and to the extent consistent with BLM multiple use management requirements; maintain, and where possible, improve forage production and quality of rangelands, fisheries, and wildlife habitat; and to the extent possible, provide habitat for threatened and endangered and special status plant and animal species on all public lands in compliance with the ESA and approved recovery plans. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- The BLM will participate in the development of both, a conservation agreement/assessment strategy and a species specific recovery plan for the orchid in coordination with the USFWS and other agencies as appropriate. Orchid habitat on BLM-administered lands will be monitored to determine if recovery/conservation objectives are being met. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- The BLM will coordinate with the USFWS, the NRCS, and private landowners to ensure adequate protection for the orchid and its habitat when new activities are proposed, and to work proactively to enhance the survival of the plant. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Maintain and restore the natural species composition and structural diversity of plant communities in riparian zones and wetlands. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Form a steering committee to develop and prioritize management practices and assist BLM and USFWS with research projects. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Conduct inventories for the orchid in areas with potential habitat. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Maintain a database of all searched, inventoried, or monitored orchid sites. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Analyze vegetation treatments (mowing, prescribed fire, mechanical treatments, etc.) in known or potential habitat for the orchid to determine impacts to the species. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Establish monitoring, biological, ecological, population demographics, and life history studies as funding and staffing allow, such as, monitoring current populations each year for trends, studies regarding identification of pollinators, genetics, life history, effects of pesticides and herbicides, seed viability and germination, and studies regarding monitoring the success of reintroduction efforts. Monitor orchid population sites for invasion by noxious and invasive plant species. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Perform monitoring and analysis pertaining to flow timing, flow quantity, and water table characteristics with the goal of ensuring that riparian vegetation, in areas of known and potential habitat for the orchid, is maintained. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- When possible, collect and bank orchid seeds at local, regional, national, and international arboreta, seed banks, and botanical gardens as insurance against catastrophic events, for use in biological studies, and for possible introduction/reintroduction into potential habitat. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Train law enforcement personnel on protections for the orchid and its habitat, its status, and current threats to its existence. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Educate resource specialists, rangers, and fire crews about the orchid and its habitat to help with project design for the general area and for fire suppression actions occurring in potential

habitat for the orchid and on the habitat characteristics and plant identification for the plant, so that if they encounter the orchid occurring in riparian habitat, they can report it to their office threatened and endangered species specialist. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- The BLM should work towards developing reintroduction sites in coordination with the USFWS and to maintain the integrity of these sites for the survival of the orchid. The objective would be to reintroduce populations of the orchid into areas of historic occurrence and introduce new populations in suitable habitat within the plant's historic range. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)
- Develop propagation techniques and use them to reintroduce/introduce the orchid and to repopulate known populations in the event population recovery becomes necessary. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)
- In known occupied Ute ladies'-tresses habitat, the Service recommends that the Bureau use management actions that are compatible with protection and conservation of pollinators of the Ute ladies'-tresses orchid. (USFWS Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BO)
- Where good habitat quality exists, maintain current management practices considering plant composition and soil type. (BLM National Sage-Grouse Habitat Conservation Strategy)
- Maintain seeps, springs, wet meadows, and riparian vegetation in a functional and diverse condition for young Greater Sage-Grouse and other species that depend on forbs and insects associated with these areas. (BLM National Sage-Grouse Habitat Conservation Strategy)
- Restore lost riparian and wetland plant species diversity and structure by replanting appropriate species near crucial Greater Sage-Grouse habitat. (BLM National Sage-Grouse Habitat Conservation Strategy)
- Treatments should be designed to improve a deficient condition within the community (e.g., poor cover of herbaceous understory). (BLM National Sage-Grouse Habitat Conservation Strategy)

Impact Analysis and Effects Determination
A summary of the special status species - plants resources within the planning area can be found in the Buffalo RMP Revision in Section 3.4.7, the *Special Status Species – Plants* section of Chapter 3. This summary, the proposed management actions, and above Conservation Measures were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – Protection and conservation of the Ute ladies'-tresses orchid and its habitat could have beneficial effects on this species. Restrictions on actions within Ute ladies'-tresses orchid habitat may help to improve habitat. Implementing special status plant management actions *may affect, not likely to adversely affect* the Ute ladies'-tresses orchid due to *beneficial effects (NLAA-b)*. This determination is based on the potential that these actions will limit disturbance in Ute ladies'-tresses orchid potential habitats.

Northern Long-Eared Bat – Overlap of potential special status plant habitat or known occurrences and suitable habitat for northern long-eared bat is extremely limited; the only potential for overlap in the northeast corner of Campbell County (RMP Map 34). The only special status plant species where there is a potential overlap is Porter's sagebrush, which is not expected to

occur within forested habitat, and has not been documented in Campbell County. Implementation of the management actions for special status plant resources will have *no effect (NE)* on the northern long-eared bat, due to the unlikelihood that actions will occur in suitable habitat.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Protection and enhancement of special status plant species on non-federal lands will conserve habitat for listed or proposed species and potentially limit habitat fragmentation.

Special Status Species – Fish and Wildlife

Proposed Management Actions for Special Status Fish and Wildlife Resources
The Proposed RMP proposes the following protections for special status fish and wildlife resources that benefit listed or proposed species:

Fish

- Modify projects that may affect special status species fish to protect these species. Consult with the USFWS in such cases, as required by the ESA. (SS Fish-4001)
- Assist authorized agencies in the restoration, reintroduction, augmentation, or reestablishment of special status species populations and habitats. (SS Fish-4002)
- Prioritize special status fish species over other fish species in the planning and management actions. (SS Fish-4003)
- Implement actions set forth in recovery plans, conservation measures, terms and conditions, and appropriate BMPs and reasonable and prudent measures within BOs for Threatened and/or Endangered fish species. (SS Fish-4004)
- Support WGFD in obtaining water rights for the benefit of special status fish habitat. (SS Fish-4005)
- Restore or improve important stream segments for special status fish. (SS Fish-4006)
- Prohibit new surface-disturbing activities within 0.25 mile of any waters containing special status fish species, unless it benefits the species. Exceptions must demonstrate the proposed impacts cannot be avoided and the proposal is the least environmentally damaging alternative. (SS Fish-4007)
- Apply an NSO stipulation within 0.25 mile of any waters containing special status fish species. (SS Fish-4008)
- All new surface-disturbing activities within 0.25 mile of any waters containing special status fish species, must demonstrate that the proposed action will benefit the species or will be the least environmentally damaging alternative. (SS Fish-4009)

Wildlife

- Utilize current research, management and conservation plans, and similar related documents to guide special status species habitat management. (SS WL-4001)

- Implement actions set forth in recovery plans, conservation measures, terms and conditions, protection measures, and appropriate BMPs and reasonable and prudent measures within BOs for Threatened and/or Endangered wildlife species, including those specific to this RMP and any future statewide programmatic BOs. (SS WL-4002)

- Maintain (size and quality) or enhance current habitat utilized by special status species. Enlarge/restore habitat on a site-specific basis. (SS WL-4003)

- Manage surface-disturbing and disruptive activities to mitigate impacts on special status wildlife species and their habitats. (SS WL-4006)

- Apply a CSU stipulation to fluid mineral leases containing special status species habitat. Surveys required for clearance. (SS WL-4007)

- Restore Greater Sage-Grouse brood-rearing habitats in wetland/riparian areas. Maintain seeps, springs, wet meadows, and riparian vegetation in a functional and diverse condition for young Greater Sage-Grouse and other species that depend on forbs and insects associated with these areas. (SS WL-4012)

- Minimize disturbances that would result in alterations to springs and riparian Greater Sage-Grouse habitat. In coordination with stakeholders, develop alternative water sources to replace natural sources that have been affected or destroyed. (SS WL-4014)

- Establish a year-round disturbance-free buffer zone of at least 0.5 mile for known active bald eagle nests. Establish a 1-mile limited activity zone for known active nests (February 1 to August 15). (SS WL-4026)

- Establish a year-round disturbance-free buffer zone of at least 0.5 mile for consistently used bald or golden eagle winter roosts and the following riparian corridors consistently used by bald eagles: Clear Creek, Crazy Woman Creek, Piney Creek, Powder River, and Tongue River. The stipulation area may be adjusted to 1.0 mile based on topographic features, visibility, disturbance and human activity levels, and other factors. This buffer zone restriction will be based on site specific information and coordinated with the USFWS Wyoming Field Office.

  Additionally, establish a 1-mile limited activity zone for consistently used roosts and the identified riparian corridors (November 1 to April 1). The buffer zone restriction will be based on site specific information and coordinated with the USFWS's Wyoming Field Office, which will provide written concurrence. (SS WL-4027)

- Apply an NSO stipulation to fluid mineral leases within 0.5 mile of consistently used bald or golden eagle winter roosts and the following riparian corridors consistently used by bald eagles: Clear Creek, Crazy Woman Creek, Piney Creek, Powder River, and Tongue River. The stipulation area may be adjusted to 1.0 mile based on topographic features, visibility, disturbance and human activity levels, and other factors. This buffer zone restriction will be based on site specific information and coordinated with the USFWS Wyoming Field Office. (SS WL-4028)

  Additionally, apply a 1-mile limited activity TLS for consistently used roosts and the identified riparian corridors (November 1 to April 1). The buffer zone restriction will be based on site specific information and coordinated with the USFWS's Wyoming Field Office, which will provide written concurrence. (SS WL-4028)

- Prohibit surface-disturbing, disruptive activities, or surface occupancy within USFWS recommended spatial buffers or seasonal dates for active raptor nests. Apply NSO and TLS to new fluid mineral leases. (SS WL-4029, SS WL-4030, SS WL-4031, SS WL-4032)

- Require surveys for special status amphibian, reptile, and bat species prior to approving any project or activity that may impact the habitat for these species. Habitat includes: caves, mature forest, perennial waters, vernal pools, playas, wetlands, and south-facing rock outcrops. Allow surface-disturbing and disruptive activities and apply a CSU stipulation to mineral leases within 1,640 feet (500 meters) of caves, mature forest, perennial waters, vernal pools, playas, wetlands, and south facing rock outcrops for the protection of special status amphibian, reptile, and bat species and their habitats when population and habitats can be conserved. (SS WL-4033, SS WL-4034)

Conservation Measures Specific to Special Status Species - Fish and Wildlife Resources
The following are Conservation Measures, identified in BA Section 9, that may benefit listed or proposed species and are specific to special status species fish and wildlife resource management:

- Implement actions set forth in recovery plans, conservation measures, terms and conditions, and appropriate BMPs and reasonable and prudent measures within BOs for Threatened and/or Endangered plant species. (SS Plants-4001)

- Establish monitoring protocols that will be incorporated into project approvals as appropriate and necessary. (BLM IM WY-2012-019)

- Within the potential of the ecological site (soil type, landform, climate, and geology), the BLM will ensure that the soils are stable and allow for water infiltration to provide for optimal plant growth and minimal surface runoff. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- The BLM will maintain biological diversity of plant and animal species; support the WGFD strategic plan population objective levels to the extent practical and to the extent consistent with BLM multiple use management requirements; maintain, and where possible, improve forage production and quality of rangelands, fisheries, and wildlife habitat; and to the extent possible, provide habitat for Threatened and Endangered and special status plant and animal species on all public lands in compliance with the ESA and approved recovery plans. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- The BLM will manage stream habitats to retain, re-create, or mimic natural hydrology, water quality, and related vegetation dynamics. Projects that may alter natural hydrology or water quality change the vegetation of the riparian ecosystem and cause direct ground disturbance will be evaluated and redesigned to ensure that adverse effects to populations of the Ute ladies'-tresses orchid do not occur. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Develop and prioritize management practices and assist USFWS with research projects. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Conduct inventories for the orchid in areas with potential habitat. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Maintain a database of all searched, inventoried, or monitored orchid sites. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Analyze vegetation treatments in known or potential habitat for the orchid to determine impacts to the species. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Establish monitoring, biological, ecological, population demographics, and life history studies as funding and staffing allow, such as, monitoring current populations each year for trends, studies regarding identification of pollinators, genetics, life history, effects of pesticides and herbicides, seed viability and germination, and studies regarding monitoring the success of reintroduction efforts. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- When possible, collect and bank orchid seeds at local, regional, national, and international arboreta, seed banks, and botanical gardens as insurance against catastrophic events, for use in biological studies, and for possible introduction/reintroduction into potential habitat. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Train law enforcement personnel on protections for the orchid and its habitat, its status, and current threats to its existence. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Restore lost riparian functioning systems by repairing abnormally incised drainages to raise water tables and increase water storage and brood-rearing habitats within Greater Sage-Grouse habitat. (BLM National Sage-Grouse Habitat Conservation Strategy)

- BLM will take actions to protect Northern Long-Eared Bat hibernacula. Where a known Northern Long-Eared Bat hibernaculum is experiencing threats, BLM work with the USFWS and other partners to provide the necessary protections (e.g., limit human disturbance, install bat-friendly gates, ensure the use of "clean" clothing and gear).

- BLM will participate in actions to manage and reduce the impacts of WNS on Northern Long-Eared Bats. A national plan was prepared by the USFWS and other state and federal agencies that details actions needed to investigate and manage WNS. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- BLM will avoid disturbing/injuring hibernating bats by:

    - Not entering Northern Long-Eared Bat hibernacula during the hibernation season, unless coordinated with the Service for survey, research, or other management purposes.

    - Complying with all cave and mine closures, advisories, and regulations. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- BLM will avoid destruction/alteration (e.g., fill, cause collapse of) of caves/mines that may support hibernating bats by avoiding modifying cave or mine entrances that support hibernating bats. If there are safety concerns or concerns about bats (e.g., disturbance, vandalism) at a site, only "bat friendly" cave/mine gates will be installed. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- BLM will avoid/minimize alterations of clean drinking water and foraging areas by protecting potential recharge areas of cave streams and other karst features that are hydrologically connected to known or assumed hibernacula. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- BLM will avoid disturbing/killing/injuring Northern Long-Eared Bats during spring staging/fall swarming by not clearing occupied spring staging and fall swarming habitat near known Northern Long-Eared Bat hibernacula during the staging and swarming seasons. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- BLM will minimize the spread of WNS. If a cave or mine that could harbor hibernating bats must be entered, and it does not have a cave and mine closure policy, BLM follow approved WNS decontamination protocols. Under no circumstances will clothing, footwear, or equipment that was used in a WNS-affected state or region be used. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- BLM will determine where Northern Long-Eared Bats occur in the summer.

    - Coordinate with partners to gather and evaluate Northern Long-Eared Bat location information.

    - Review both positive and negative data (e.g., acoustic transect surveys). (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- BLM will take actions to protect Northern Long-Eared Bats and their habitat within known Northern Long-Eared Bat home ranges. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- BLM will avoid killing or injuring Northern Long-Eared Bats during tree clearing activities by not clearing occupied maternity colony summer habitat during the summer maternity season. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- BLM will minimize other direct effects to Northern Long-Eared Bats by not clearing occupied summer habitat during the time of year when females are pregnant or the pups are incapable of flight. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- BLM will maintain summer maternity habitat by:

    - Retaining known roost trees, which includes live or dead trees and snags ≥3 inches diameter at breast height that have exfoliating bark, cracks, crevices, or cavities. Surveys will be conducted to determine occupancy prior to any tree clearing activities.

    - Clearly demarcating trees to be protected vs. cut to help ensure that contractors do not accidentally remove more trees than anticipated. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- BLM, in cooperation with the State of Wyoming and/or the Service, will implement inventory and monitoring to determine population status and habitat requirements, as additional information is necessary to guide management actions. (A Conservation Plan for Bats in Wyoming)

- BLM will manage BLM-administered lands where *Myotis septentrionalis* occurs in such a way that provides adequate roosting and foraging habitat to maintain stable populations (that is,

secure roosting sites; diverse, native foraging habitat; and uncontaminated water sources). (A Conservation Plan for Bats in Wyoming)

- BLM will evaluate and where appropriate require BMPs for natural caves and abandoned mines in areas where *Myotis septentrionalis* roosts. (A Conservation Plan for Bats in Wyoming)

Impact Analysis and Effects Determination
A summary of the special status species - fish and special status species - wildlife resources within the planning area can be found in the Buffalo RMP Revision in Section 3.4.8, the *Special Status Species - Fish* and 3.4.9, *the Special Status Species - Wildlife* sections of Chapter 3. This summary, the proposed management actions, and above Conservation Measures were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – Management actions associated with special status species could benefit Ute ladies'-tresses orchid habitat. The restriction of surface-disturbing activities within 0.25 mile of fish bearing streams and 500 feet of wetlands would benefit the Ute ladies'-tresses orchid. Implementing special status wildlife species management actions *may affect, not likely to adversely affect* the Ute ladies'-tresses orchid due to *beneficial effects (NLAA-b)*.

Northern Long-Eared Bat – Potential suitable habitat for the northern long-eared bat in the planning area is limited to Campbell County. Management and protection of habitats for other special status wildlife species may influence potential suitable habitat for the species. Special Status Wildlife Species Management Actions under the Proposed RMP in forested habitats will protect existing habitats, mitigate impacts from surface-disturbing and disruptive activities, and lead to enhanced roosting and foraging habitat for the bat. Management actions that protect riparian areas could benefit the species by improving access to water and foraging. There is no overlap between special status fish habitat, which is limited to northwestern Sheridan County (RMP Map 28), and potential suitable habitat for the northern long-eared bat. Special status species habitat enhancements would not occur within occupied northern long-eared bat habitat. Suitable habitat would be surveyed prior to any enhancement activities, any projects planned for occupied habitat would be postponed until northern long-eared bats are not present. Implementing management actions for special status wildlife resources under the Proposed RMP *may affect, not likely to adversely affect (NLAA-b)* the species within the planning area, due to beneficial effects. This determination is based on maintenance and improvement of habitat, and protection of individuals.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Protection of special status fish and wildlife species and maintenance and enhancement of their habitats on non-federal lands will provide additional benefits for listed or proposed species. In addition, limitations to development and disturbance will reduce further habitat fragmentation and species displacement.

Cultural Resources

Proposed Management Actions for Cultural Resources
The Proposed RMP proposes the following protections for cultural resources that benefit listed or proposed species:

- Complete site stabilization and long-term protection for significant sites that are experiencing adverse impacts. (Cultural-5001)

- Prohibit surface disturbance within the following sites: Pumpkin Buttes, Cantonment Reno, Dull Knife Battle, Crazy Woman Battle, Contributing and Unevaluated Segments of the Bozeman Trail, all Rock Art Sites, all Rock Shelter Sites, all Native American Burials. (Cultural-5007)
- Allow surface disturbance and infrastructure within 3 miles of the following sites where development is either not visible, or will result in a weak contrast to the setting: Pumpkin Buttes, Cantonment Reno, Dull Knife Battle, Crazy Woman Battle, Contributing and Unevaluated Segments of the Bozeman Trail, all Rock Art Sites, all Native American Burials. (Cultural-5007)
- Mitigate adverse effects to sensitive sites such as traditional cultural properties (TCPs) and/or sacred sites through appropriate prohibitions and measures to protect setting. (Cultural-5011)

Conservation Measures Specific to Cultural Resources
No conservation measures, identified in BA Section 9, that may benefit listed and proposed species are specific to cultural resource management.

Impact Analysis and Effects Determination
A summary of the cultural resources within the planning area can be found in the Buffalo RMP Revision in Section 3.5.1, the *Cultural Resources* section of Chapter 3. This summary and the proposed management actions were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – Cultural resource management may affect the Ute ladies'-tresses orchid by excavating soils and removing or trampling vegetation in areas where management actions are implemented. Surface-disturbing activities associated with cultural resource investigations can vary in size and degree of disturbance. Impacts to the Ute ladies'-tresses orchid will depend on the number of people conducting the investigation, the time of year, duration of the field actions, use of heavy machinery or hand tools, and the type of habitat affected. Disturbance to potential Ute ladies'-tresses orchid habitat will only likely occur if large-scale excavation takes place. Avoiding surface-disturbing activities and protecting important cultural sites up to 3 miles from the sites will benefit the species if there is suitable occupied habitat within 3 miles of the sites; cultural sites are often found in riparian habitats. Implementing cultural resource management actions *may affect, not likely to adversely affect* the Ute ladies'-tresses orchid due to *discountable effects (NLAA-d)*. This determination is based on the BLM's commitment to the conservation measures, which make surface-disturbing activities unlikely to occur in potential Ute ladies'-tresses orchid habitats. In addition, the BLM requires surveys to determine the presence or absence of the Ute ladies'-tresses orchid if surface disturbance is planned in potential habitat. If cultural resources are found in potential Ute ladies'-tresses orchid habitats, restrictions protecting the cultural resources may benefit the Ute ladies'-tresses orchid.

Northern Long-Eared Bat – The northern long-eared bat has only been positively identified to occur in northeastern Campbell County. Approximately 18% of potential habitat identified by the USFWS overlays BLM administered surface lands in Campbell County; however, based on the distribution maps provided by WYNDD for the species, the likelihood that all of this habitat would be occupied by the species is minimal. WYNDD's predicted occurrence for the species only includes a small portion of forested habitat in northeast Campbell County. Because one individual bat was captured in the Spring Creek area, it is possible that the forested areas in close proximity to that area may also be occupied. Taking this into consideration, occupied habitat that may be affected by cultural actions is limited. Most actions associated with cultural resource inventories,

including surface surveys, record searches, and artifact characterization, will not affect the species. More intensive excavation efforts and development of interpretive sites could disturb the bat if such actions occurred in occupied habitats during the late spring and summer months. Tree removal would be unlikely; however, if tree removal were necessary it would be limited and take place when no bats are present. Developing interpretive sites will occur where the cultural objects and sites themselves are located. If such a site were discovered or occurred in suitable habitat, it could create a conflict; however, the likelihood of this event taking place is negligible and timing of activities would be limited. Activities associated with interpretive sites are also expected to be small in scale and infrequent in nature. Avoiding surface-disturbing activities and protecting important cultural sites will benefit the species if portions of the protected areas are in occupied habitat. Implementing cultural resource management actions *may affect, not likely to adversely affect (NLAA-d)* the species within the planning area, due to discountable effects. If cultural resources are found in suitable habitats, restrictions protecting the cultural resources may benefit the species, and conservation measures to avoid impacts to the bat will be implemented.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. The cumulative effects of cultural resource programs on non-federal lands are anticipated to be limited across the planning area and therefore not result in an adverse effect on listed or proposed species.

Paleontological Resources

Proposed Management Actions for Paleontological Resources

The Proposed RMP proposes the following protections for paleontological resources that benefit listed or proposed species:

- Retain public lands with significant paleontological values. (Paleo-5001)
- Designate areas containing paleontological resources of high quality or importance for special management, as they are identified. (Paleo-5005)
- Avoid areas containing paleontological resources of high quality or importance when developing locatable minerals. (Paleo-5006)
- Apply an NSO stipulation to mineral leases in areas containing paleontological resources of high quality or importance. (Paleo-5007)
- Avoid areas containing paleontological resources of high quality or importance when developing salable minerals. (Paleo-5008)

Conservation Measures Specific to Paleontological Resources

No conservation measures, identified in BA Section 9, that may benefit listed or proposed species are specific to paleontological resource management.

Impact Analysis and Effects Determination

A summary of the paleontological resources within the planning area can be found in the Buffalo RMP Revision in Section 3.5.2, the *Paleontological Resources* section of Chapter 3. This summary and the proposed management actions were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – Southern Campbell County, the portion of the Buffalo planning area with the best potential for supporting Ute ladies'-tresses orchids (Heidel 2007), has moderate potential for yielding fossils (RMP Map 47). The Pumpkin Buttes have very high fossil potential, however, the buttes are not suitable orchid habitat. Collecting fossils on public land will have minimal effects on the Ute ladies'-tresses orchid and its habitats. Potential impacts depend on the number of people conducting the investigation, the time of year, duration of the field actions, use of heavy machinery or hand tools, and the type of habitats affected. As with any surface-disturbing activity, surveys for Ute ladies'-tresses orchid will be conducted in potentially suitable habitats prior to any surface-disturbing activity taking place. Implementing paleontological management actions *may affect, not likely to adversely affect* the Ute ladies'-tresses orchid due to *discountable effects (NLAA-d)*. This determination is based on existing conservation measures in place that will minimize impacts to the species.

Northern Long-Eared Bat – Northeastern Campbell County has very high fossil potential (RMP Map 47). Collection of fossils on public land will have minimal effects on northern long-eared bat and their habitats. Possible effects include increased human activity and minor surface disturbances associated with fossil retrieval. Tree removal would be minimal and likely to only be individual trees in dig sites. If fossil recovery were planned in occupied habitats, activities would be restricted during sensitive periods such as summer roosting. Collection activities are expected to be small in scale and infrequent in nature. Implementing paleontological resources management *may affect, not likely to adversely affect (NLAA-i)* within the planning area, due to insignificant effects. This determination is based on the existing conservation measures and the relatively small amount of surface disturbance associated with fossil collection.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. No actions associated with paleontology on non-federal lands that could affect listed or proposed species are anticipated.

Visual Resource Management

Proposed Management Actions for Visual Resource Management

The Proposed RMP proposes the following protections for VRM that benefit listed or proposed species:

- Manage WSAs under VRM Class I objectives. Any facilities or structures proposed in WSAs will be designed so as not to impair wilderness suitability. (VRM-5001)
- If the Middle Fork Powder River is designated by Congress as a WSR, the river will be managed as VRM Class I. (VRM-5002)
- Manage VRM Class II areas (except Powder River Breaks and Fortification Creek) and special emphasis areas as VRM Class II. (VRM-5005)
- Complete a visual simulation and mitigation design for all proposed actions within VRM Classes I and II. Visual simulation and mitigation design may be required on a project specific basis within VRM Class III areas with high visual sensitivity. (VRM-5007)

Conservation Measure Specific to Visual Resources

There are no Conservation Measures, identified in BA Section 9, that may benefit listed or proposed species which specific to VRM.

Impact Analysis and Effects Determination
A summary of the visual resources within the planning area can be found in the Buffalo RMP Revision in Section 3.5.3, the *Visual Resources* section of Chapter 3. This summary and the proposed management actions were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – Development at the scale provided for in VRM Classes III and IV, 48% and 33% of the BLM surface (RMP Map 51), respectively, could potentially remove large areas of suitable habitat. Fortunately most actions, except where necessary, would be sited to avoid riparian areas and therefore Ute ladies'-tresses orchid habitat. Implementing VRM actions *may affect, not likely to adversely affect*, the Ute ladies'-tresses orchid due to *discountable effects (NLAA-d)*. This determination is based on no known populations of Ute ladies'-tresses orchid occurring in the planning area and the incorporation of conservation measures.

Northern Long-Eared Bat – The northern long-eared bat has only been positively identified to occur in northeastern Campbell County. Based on the distribution maps provided by WYNDD for the species, the likelihood that all the potential habitat identified by the USFWS would be occupied by the species is minimal. WYNDD's predicted occurrence for the species only includes a small portion of forested habitat in northeast Campbell County. Because one individual bat was captured in the Spring Creek area, it is possible that the forested areas in close proximity to that area may also be occupied. Taking this into consideration, occupied habitat that may be affected is limited. All activities associated with visual resources management are generally administrative in nature. Development at the scale provided for in VRM Classes III and IV, 48% and 33% of the BLM surface (RMP Map 51), respectively, could potentially remove areas of suitable habitat; however, these actions are analyzed under their respective program areas in this BA. Actions resulting in habitat alteration could impact suitability of habitat, but are not likely to result in the mortality of individuals given that conservation measures such as timing of activities will be applied in occupied habitat. Areas managed as Class I or II, may prevent habitat loss. Implementing VRM actions *may affect, not likely to adversely affect (NLAA-i)* the species within the planning area, due to insignificant effects. This determination is based on the incorporation of management actions that will serve to avoid adverse impacts.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. No actions associated with VRM on non-federal lands that could affect listed or proposed species are anticipated.

Forest Products

Proposed Management Actions for Forest Products
The Proposed RMP proposes the following actions for forest products that benefit listed or proposed species:

- Prohibit forest management activities within 200 feet of surface waters. (FP-6001)
- Allow the sale of permits to meet the public demand for personal use of forest products consistent with wildlife habitat requirements and other resource values. (FP-6002)
- Manage forest product sales to remain within ecologically sustainable limits while maximizing economic return. (FP-6004)

- Design/shape forest management areas to have meandering boundaries, follow topography, avoid natural barriers, and in accordance with other resource values and within the limits of the Wyoming Forestry BMPs and other guidance without limiting the harvest area size. (FP-6006)
- Protect forest regeneration areas that are being damaged or in an area where damage is probable. (FP-6007)
- Evaluate forest management areas and their successional dynamics, and where necessary implement tactics to assure regeneration (forest sustainability). (FP-6008)
- Utilize pre-commercial thinning and other silvicultural practices to create healthy and economically sustainable forest stands consistent with other resource values. (FP-6009)

Conservation Measures Specific to Forest Products
The following are Conservation Measures, identified in BA Section 9, that may benefit listed or proposed species and that are specific to forest products management:

- BLM will avoid disturbing/killing/injuring Northern Long-Eared Bats during spring staging/fall swarming by:
  - not clearing occupied spring staging and fall swarming habitat near known Northern Long-Eared Bat hibernacula during the staging and swarming seasons. Surveys will be conducted to determine occupancy prior to any tree clearing activities.
  - avoiding planned fire or other sources of smoke in known Northern Long-Eared Bat habitat during the swarming/staging or hibernation season, or coordinate with the USFWS. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will avoid killing or injuring Northern Long-Eared Bats during tree clearing activities by not clearing occupied maternity colony summer habitat during the summer maternity season. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will minimize other direct effects to Northern Long-Eared Bats by not clearing occupied summer habitat during the time of year when females are pregnant or the pups are incapable of flight. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will maintain summer maternity habitat by:
  - Retaining known roost trees, which includes live or dead trees and snags ≥3 inches diameter at breast height that have exfoliating bark, cracks, crevices, or cavities. Surveys will be conducted to determine occupancy prior to any tree clearing activities.
  - Clearly demarcating trees to be protected vs. cut to help ensure that contractors do not accidentally remove more trees than anticipated. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will not harvest timber in areas close to occupied roosting sites during the maternity roosting period (Schmidt 2003). Surveys will be conducted to determine occupancy prior to any tree harvest activities. Patch cuts and selective harvesting will be utilized to provide regenerating forest and retain large-diameter snags (Lacki and Schwierjohann 2001). (A Conservation Plan for Bats in Wyoming)

Impact Analysis and Effects Determination
A summary of the forest product resources within the planning area can be found in the Buffalo RMP Revision in Section 3.6.1, the *Forest Products* section of Chapter 3. This summary and the proposed management actions were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – The Ute ladies'-tresses orchid is associated with riparian areas, which are not areas targeted for forest product management (RMP Map 52). Potential Ute ladies'-tresses orchid habitats are not expected to experience any effects from forest product management actions. Implementing forest products management actions has *no effect (NE)* on the Ute ladies'-tresses orchid. This determination is based on the absence of forest products management actions occurring in Ute ladies'-tresses orchid potential habitats.

Northern Long-Eared Bat – The northern long-eared bat has only been positively identified to occur in northeastern Campbell County. Approximately 18% of potential habitat identified by the USFWS overlays BLM administered surface lands in Campbell County; however, based on the distribution maps provided by WYNDD for the species, the likelihood that all of this habitat would be occupied by the species is minimal. WYNDD's predicted occurrence for the species only includes a small portion of forested habitat in northeast Campbell County. Because one individual bat was captured in the Spring Creek area, it is possible that the forested areas in close proximity to that area may also be occupied. No areas currently identified as forest products management areas (RMP Map 52) overlap areas containing potential habitat for the species. Activities associated with forest products include the sale and harvest of timber through mechanical methods such as cutting. Timber harvest often requires the building of roads that may also remove trees. Actions that open up the canopy of forested areas may improve habitat for the species (USFWS 2014). Increased light penetration may increase some insect taxa and stimulate vegetation growth in the understory (Loeb and Waldrop 2008). Female bats may prefer to roost in stands where the canopy has been opened up (but not clear cut), which may be due to trees located in more open habitat receiving greater solar radiation and therefore speeding development of young bats (USFWS 2013a). If forest product activities are planned in suitable habitat, clearance surveys and seasonal timing limitations would be implemented, as well as identification of important habitat components to be conserved such as live or dead trees and snags ≥3 inches diameter at breast height that have exfoliating bark, cracks, crevices, or cavities. Specific management is included in the Proposed RMP to utilize forestry tools that may improve and conserve habitat; therefore, implementing forest products management actions *may affect, not likely to adversely affect (NLAA-d)* the species within the planning area. This determination is based on the unlikelihood that activities would occur in suitable habitat within the currently known distribution of the species; no forest management areas are identified within Campbell County.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Forest management on non-federal lands could affect Ute ladies'-tresses orchid and northern long-eared bat potential habitats. Road building in riparian areas, related to forest management, may affect Ute ladies'-tresses orchid potential habitats. Harvesting of timber in occupied habitat could result in habitat loss and fragmentation for long-eared bats.

Lands and Realty

Proposed Management Actions for Lands and Realty
The Proposed RMP proposes the following management actions for lands and realty resources that benefit listed or proposed species:

- Consider land use authorizations (permits, leases, etc.) on a project specific basis consistent with other resource objectives. (L&R-6002)
- Acquire private or state land or interest in land from willing sellers consistent with other resource objectives, on a project specific basis. (L&R-6011)
- Acquire and dispose of land based on all resource values, including but not limited to agricultural potential and water. (L&R-6012)
- Prioritize acquiring land or interests in lands in areas adjacent to large blocks of BLM-administered land before other areas. (L&R-6014)
- Pursue easements accessing public lands that would benefit any resource value. (L&R-6013)

Conservation Measures Specific to Lands and Realty
The following Conservation Measure, identified in BA Section 9, may benefit listed or proposed species and is specific to lands and realty:

- To prevent loss of habitat for the Ute ladies'-tresses orchid, the BLM "shall retain in Federal ownership all habitats essential for the survival and recovery of any listed species, including habitat that was used historically, that has retained its potential to sustain listed species, and is deemed to be essential to their survival." (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

Impact Analysis and Effects Determination
A summary of the lands and realty program for the planning area can be found in the Buffalo RMP Revision in Section 3.6.2, the *Lands and Realty* section of Chapter 3. This summary, the proposed management actions, and above Conservation Measures were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – Land disposal and acquisition may impact Ute ladies'-tresses orchid habitats. However, the BLM rarely conveys properties with high resource values, especially those with known Threatened or Endangered species. Land acquisitions and protective withdrawals may benefit the Ute ladies'-tresses orchid by providing conservation measures for Threatened and Endangered species and their habitats. Implementing the lands and realty program *may affect, not likely to adversely affect* the Ute ladies'-tresses orchid due to *discountable effects (NLAA-d)*. This determination is based on low potential for land disposal under BLM management and implementing conservation measures for the Ute ladies'-tresses orchid and its habitats. Land acquisition of potential Ute ladies'-tresses orchid habitats may provide beneficial effects to this species.

Northern Long-Eared Bat – Land disposal and exchanges, are not likely to adversely impact northern long-eared bat habitats. The northern long-eared bat has only been positively identified to occur in northeastern Campbell County. Approximately 5% of potential habitat identified by the USFWS overlays BLM administered surface lands identified for disposal in Campbell County (RMP Map 54); however, based on the distribution maps provided by WYNDD for the species, the likelihood that all of this habitat would be occupied by the species is minimal. WYNDD's predicted occurrence for the species only includes a small portion of forested habitat in northeast

Campbell County. Because one individual bat was captured in the Spring Creek area, it is possible that the forested areas in close proximity to that area may also be occupied. Taking this into consideration, occupied habitat that may be affected is extremely limited. Lands identified for disposal that overlap suitable habitat are small parcels adjacent to private lands (RMP Map 54). Although possible, the BLM rarely conveys properties with high resource values, such as those with known special status species habitat. Conversely, land acquisitions and protective withdrawals may provide benefits to the species by acquiring additional land that contains suitable habitat. Implementing management actions for lands and realty resources *may affect, not likely to adversely affect (NLAA-d)* the species within the planning area. Disposal or exchange of lands containing suitable habitat for a proposed species is unlikely, resulting in discountable effects.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Land acquisitions, exchanges, and protective withdrawals have the potential to benefit listed or proposed species. Lands and realty management actions by state, local, or private entities could alter or remove listed or proposed species suitable habitats.

Renewable Energy

Proposed Actions for Renewable Energy
The Proposed RMP proposes the following management actions for renewable energy that benefit listed or proposed species:

- Cooperate with stakeholders to coordinate renewable energy opportunities in accordance with other resource values. (RE-6002)

- Exclude renewable energy development on 352,067 acres in accordance with management outlined in Alternative D: Southern Big Horn Mountains; areas closed to mineral leasing (fluid and solid); areas closed to locatable minerals; areas closed to salable minerals; ROW exclusion areas; areas within 3 miles and visible from historic properties that retain an intact setting; all other areas where surface disturbance is prohibited. (RE-6003)

- Avoid renewable energy development on 374,518 acres in the following areas: Mineral leasing (fluid and solid), NSO, and CSU areas; ROW avoidance areas; areas greater than 3 miles and visible from historic properties that retain an intact setting; all other areas with surface disturbance restrictions. (RE-6004)

Conservation Measure Specific to Renewable Energy Resources
There are no Conservation Measures, identified in BA Section 9, that may benefit listed or proposed species and that are specific to renewable energy resource management:

Impact Analysis and Effects Determination
A summary of the renewable energy resources within the planning area can be found in the Buffalo RMP Revision in Section 3.6.3, the *Renewable Energy* section of Chapter 3. This summary and the proposed management actions were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – Establishment of transmission lines and corridors for renewable energy systems may impact Ute ladies'-tresses orchid habitats. However, the BLM rarely establishes renewable energy projects in areas with high resource values, especially those with known Threatened or Endangered species. Riparian areas have less wind potential than higher

and more open habitats; transmission line siting also tends to avoid riparian areas, and crossings would be perpendicular to minimize riparian disturbance. Implementing the renewable energy actions *may affect, not likely to adversely affect* the Ute ladies'-tresses orchid due to *discountable effects (NLAA-d)*. This determination is based on low potential for renewable energy projects in suitable Ute ladies'-tresses orchid habitat and implementing conservation measures for the Ute ladies'-tresses orchid and its habitats.

Northern Long-Eared Bat – The northern long-eared bat has only been positively identified to occur in northeastern Campbell County. Approximately 18% of potential habitat identified by the USFWS overlays BLM administered surface lands in Campbell County; however, based on the distribution maps provided by WYNDD for the species, the likelihood that all of this habitat would be occupied by the species is minimal. WYNDD's predicted occurrence for the species only includes a small portion of forested habitat in northeast Campbell County. Because one individual bat was captured in the Spring Creek area, it is possible that the forested areas in close proximity to that area may also be occupied. Taking this into consideration, occupied habitat that may be affected is limited. Establishment of transmission lines and corridors for renewable energy systems may cause habitat loss if constructed through forested habitats. Renewable energy projects may adversely impact the species if such actions occur near suitable habitat or in migration corridors. Collision with or barotrauma (injury to the lungs due to a change in air pressure) caused by wind turbines may cause mortality. However, the BLM rarely establishes renewable energy projects in areas with high resource values, such as suitable habitat for special status species, the majority of BLM surface lands that overlap suitable habitat for the species are identified as exclusion or avoidance areas (RMP Map 56), and the wind potential in northern Campbell County is low enough that projects are unlikely to be proposed. Implementing actions associated with renewable energy *may affect, not likely to adversely affect (NLAA-d)* the species within the planning area. Development of renewable energy in or near suitable habitat for a proposed species is unlikely, resulting in discountable effects. This determination is based on the low potential for renewable energy projects to be located in areas occupied by northern long-eared bat, the existing safeguards for protection, and avoidance of special status species habitat.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Renewable energy actions by state, local, or private entities could alter or remove listed or proposed species suitable habitats, or pose direct mortality risks.

Rights-of-Way and Corridors

Proposed Management Actions for Rights-of-Way and Corridors

The Proposed RMP proposes the following management actions for ROW and corridors that benefit listed or proposed species:

- Designate corridors for major ROW to minimize surface disturbance and impacts to other resources. (ROW-6001)
- Provide reasonable access across public land to private land, subject to other resource values. (ROW-6002)
- The preferred location for new ROWs will be in or adjacent to existing disturbed areas associated with existing ROWs, constructed roads, or highways. (ROW-6004)

- Maintain a transportation management system in cooperation with appropriate state and local agencies to meet public and resource management needs. (ROW-6005)
- Make lands available for ROWs in accordance with management identified within Alternative D to conserve other resources. (ROW-6006)
- Designate the following corridors for major ROWs: Echeta Road, Sheridan to Gillette, largely following US 14/16, Highway 59 north of Gillette, Interstate 25, Interstate 90, Gillette to Montana State Line, Powder River, Powder River Breaks (Buffalo to Gillette). Corridor use is required. No above ground lines will be authorized in the Powder River or Powder River Breaks corridors. Lines must be buried within Greater Sage-Grouse Core Population Areas unless within 0.5 mile either side of existing 115 kV or larger transmission lines creating a corridor no wider than 1.0 mile. (ROW-6009)

Conservation Measure Specific to Rights-of-Way and Corridors
The following are Conservation Measures, identified in BA Section 9, that may benefit listed or proposed species and are specific to ROWs and corridors:

- Allow ROWs within areas containing habitat for special status species plants, though not within areas of known populations. (SS Plants-4007)
- In any proposed new access, wetland and riparian areas will be avoided where possible. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)
- All proposed ROWs projects (powerlines, pipelines, roads, etc.) will be designed and locations selected at least 0.25 miles from any known Ute ladies'-tresses orchid habitat to minimize disturbances. If avoidance of adverse effects is not possible, the BLM will re-initiate consultation with the Service. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)
- Where existing leases or ROWs have had some level of development (road, fence, well, etc.) and are no longer in use, reclaim the site by removing these features and restoring the habitat. (BLM IM 2012-044)
- Where existing leases or ROWs have had some level of development (road, fence, well, etc.) and are no longer in use, reclaim the site by removing these features and restoring the habitat. Within designated priority habitat, reclaim by removing these features and restoring the habitat of these ROW that are no longer in use. (BLM IM 2012-044)
- Place roads outside of riparian areas where possible. (Northeast Wyoming Sage-Grouse Conservation Plan)
- If avoidance is not possible, minimize impacts to riparian, wetland, or wet meadow habitats to limit impacts to brood-rearing areas. (Northeast Wyoming Sage-Grouse Conservation Plan)
- Select sites for construction that will not disturb suitable nest cover or brood-rearing habitats within 3 miles (5 kilometers) of occupied leks, or within identified nesting and brood-rearing habitats outside the 3-mile (5 kilometer) perimeter (Connelly et al. 2000). (Northeast Wyoming Sage-Grouse Conservation Plan)
- Locate any above-ground powerlines off of ridges and out of riparian areas (1,000 ft. (300 m) riparian buffer where feasible). (Northeast Wyoming Sage-Grouse Conservation Plan)

- BLM will avoid destruction/alteration (e.g., fill, cause collapse of) of caves/mines that may support hibernating bats by:
  - Prohibiting woody vegetation or spoil (e.g., soil, rock, etc.) disposal within 100 feet of known hibernacula entrances and associated sinkholes, fissures, or other karst features.
  - When blasting within 0.5 miles of known or presumed occupied hibernacula entrances and passages, BLM will coordinate with the USFWS to ensure that the blasting will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of the hibernacula. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will avoid/minimize alterations of clean drinking water and foraging areas by:
  - Protecting potential recharge areas of cave streams and other karst features that are hydrologically connected to known or assumed hibernacula.
  - Setting back equipment servicing and maintenance areas at least 300 feet away from streambeds, sinkholes, fissures, or areas draining into sinkholes, fissures, or other karst or mine features.
  - Following available standards on spill prevention, containment, and control.
  - Restricting use of herbicides for vegetation management near known or assumed Northern Long-Eared Bat hibernacula to those specifically approved for use in karst (e.g., sinkholes) and water (e.g., streams, ponds, lakes, wetlands).
  - Implementing strict adherence to sediment and erosion control measures and reclamation standards. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will avoid disturbing/killing/injuring Northern Long-Eared Bats during spring staging/fall swarming by not clearing occupied spring staging and fall swarming habitat near known Northern Long-Eared Bat hibernacula during the staging and swarming seasons. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will avoid killing or injuring Northern Long-Eared Bats during tree clearing activities by not clearing occupied maternity colony summer habitat during the summer maternity season. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will minimize other direct effects to Northern Long-Eared Bats by not clearing occupied summer habitat during the time of year when females are pregnant or the pups are incapable of flight. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (Northern Long-Eared Bat Interim Conference and Planning Guidance)
- BLM will avoid/minimize altering clean drinking water and foraging areas by:
  - Implementing sediment and erosion control measures and reclamation standards.
  - Siting equipment servicing and maintenance areas at least 300 feet away from waterbodies (e.g., wetlands, streams). Following available standards on spill prevention, containment, and control. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

- BLM will maintain summer maternity habitat by:
    - Retaining known roost trees, which includes live or dead trees and snags ≥3 inches diameter at breast height that have exfoliating bark, cracks, crevices, or cavities. Surveys will be conducted to determine occupancy prior to any tree clearing activities.
    - Clearly demarcating trees to be protected vs. cut to help ensure that contractors do not accidentally remove more trees than anticipated. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

Impact Analysis and Effects Determination
A summary of the ROWs and corridors within the planning area can be found in the Buffalo RMP Revision in Section 3.6.4, the *ROW and Corridors* section of Chapter 3. This summary, the proposed management actions, and above Conservation Measures were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – New ROW and corridor areas through potential Ute ladies'-tresses orchid habitat are not expected to occur in the planning area. Based on the conservation measures for Ute ladies'-tresses orchid, riparian/wetland habitats would be avoided, thereby minimizing impacts. Existing ROW corridors are the preferred location for ROW grants. These routes or areas are located primarily along existing highways, major pipelines and powerlines, oil fields, and communication sites, which do not typically contain Ute ladies'-tresses orchid habitat. Implementing ROW and corridor management actions *may affect, not likely to adversely affect* the Ute ladies'-tresses orchid due to *discountable effects (NLAA-d)*. This determination is because no Ute ladies'-tresses orchids have been recorded in the planning area, conservation measures are in place, and wetland and riparian areas would be avoided for new construction.

Northern Long-Eared Bat – The northern long-eared bat has only been positively identified to occur in northeastern Campbell County. Approximately 18% of potential habitat identified by the USFWS overlays BLM administered surface lands in Campbell County; however, based on the distribution maps provided by WYNDD for the species, the likelihood that all of this habitat would be occupied by the species is minimal. WYNDD's predicted occurrence for the species only includes a small portion of forested habitat in northeast Campbell County. Because one individual bat was captured in the Spring Creek area, it is possible that the forested areas in close proximity to that area may also be occupied. Taking this into consideration, occupied habitat that may be affected is limited. Establishment of new ROW and corridor areas may affect northern long-eared bat, but not to a measurable extent. The BLM rarely establishes new ROW and corridors in areas with high resource values, such as suitable habitat for special status species. Activities resulting from ROW grants include the construction of roads, pipelines, and power lines using heavy equipment. Existing ROW corridors are the preferred location for ROW grants. The construction of roads within established ROWs decreases adverse effects. ROW and corridor activities may adversely affect the species if such actions occur in suitable or occupied habitat during spring and summer months or result in habitat loss; however, the BLM would regulate when construction of facilities could occur, avoiding sensitive time periods. The likelihood that activities would occur in suitable habitat is low due to the scattered land pattern of BLM-administered surface lands, the avoidance areas identified in the RMP (RMP Map 59), and the topography typically associated with forested areas in Campbell County. Burnt Hollow SRMA is identified as an exclusion area, and the majority of Weston Hills SRMA is identified as an avoidance area. Implementing actions associated with ROWs and corridors *may affect, not likely to adversely affect (NLAA-d)* the species within the planning area. Development of powerlines or roads in or near suitable habitat

for the proposed species is unlikely, resulting in discountable effects. This determination is based on the low potential for projects to be located in areas occupied by northern long-eared bat, the existing safeguards for protection, and avoidance of special status species habitat.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. ROW and corridor management on state and private lands may also remove and fragment habitats.

Travel and Transportation Management

Proposed Management Actions for Travel Management
The Proposed RMP proposes the following management actions for comprehensive travel management that benefit listed or proposed species:

- Evaluate roads constructed under other initiatives (e.g., oil and gas exploration) for inclusion in the BLM transportation system. Roads that are no longer needed for their original purposes are assessed for addition to the BLM transportation system prior to reclamation. (Trans-6002)
- Design, construct, and maintain roads or trails based on the specific objectives for that trail or road in consideration of other resources. Design, construct, and maintain roads to minimize surface disturbance, changes to surface water runoff, and erosion. (Trans-6004)
- Maintain transportation system roads under BLM jurisdiction in accordance with assigned maintenance levels and in consideration of other resource values. Maintain administrative roads on an as needed basis, dependent on time, funding, and access priorities. (Trans-6007)
- Restrict motorized travel to signed roads in areas limited to designated roads and trails. (Trans-6010)
- Consider nominations from the public for appropriate OHV use areas, consistent with other resource values. (Trans-6015)
- Prohibit motorized travel on soils if damage to vegetation, soils, or water quality would result. (Trans-6016)
- Allow motorized vehicle use within habitat of special status species consistent with travel management designations for that area. Routes will be designated to avoid occupied habitat. (Trans-6017)
- Limit motorized vehicle use to designated routes within habitat of special status species consistent with travel management designations for that area. Routes will be designated to avoid occupied habitat during travel management planning. (Trans-6019)
- Evaluate existing routes in the vicinity of any new system roads for closure and reclamation consistent with other resource values. (Trans-6020)
- Close areas to motorized vehicle use to protect sensitive resources as defined in the corresponding special designation and resource sections of Alternative D and in addition include: WSAs, Lands with wilderness characteristics, Middle Fork Canyon, Cantonment Reno, Dry Creek Petrified Tree Environmental Education Area (EEA), and a 500-foot buffer of designated nonmotorized trails. (Trans-6021)

- Limit motorized vehicle travel to designated roads and trails, consistent with other resource values in Alternative D. (Trans-6022)

- Allow travel not causing resource damage to go up to 300 feet off designated routes for dispersed camping and game retrieval, consistent with travel management designations in defined areas. (Trans-6025)

Conservation Measure Specific to Travel and Transportation Management
The following are Conservation Measures, identified in BA Section 9, that may benefit listed or proposed species and are specific to travel management:

- In any proposed new access, wetland and riparian areas will be avoided where possible. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- The BLM will limit the use of OHVs to designated roads and trails within 0.5 mile of known Ute ladies'-tresses orchid populations, with no exceptions for the "performance of necessary tasks" other than firefighting and hazardous material cleanup allowed using vehicles off of highways. No OHV competitive events will be allowed within 1.0 mile of known Ute ladies'-tresses orchid populations. Roads that have the potential to impact Ute ladies'-tresses orchid are not required for routine operations or maintenance of developed projects, or lead to abandoned projects will be reclaimed as directed by the Bureau. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- In order to conserve and protect natural areas, planned recreational foot trails are created to control human traffic. The BLM will create programs that will strive to protect the Ute ladies'-tresses habitat and prevent new trails from being constructed within 0.25 miles from known occurrences of the orchid. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Recreational foot trails that may be located adjacent to Ute ladies' tresses plant habitat should be constructed to reduce impacts to this species. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Conduct restoration of roads, primitive roads and trails not designated in travel management plans. This also includes primitive route/roads that were not designated in WSAs and within Lands with Wilderness Characteristics that have been selected for protection. (BLM IM 2012-044)

- Place roads outside of riparian areas where possible. (Northeast Wyoming Sage-Grouse Conservation Plan)

- If avoidance is not possible, minimize impacts to riparian, wetland, or wet meadow habitats to limit impacts to brood-rearing areas. (Northeast Wyoming Sage-Grouse Conservation Plan)

- Select sites for construction that will not disturb suitable nest cover or brood-rearing habitats within 3 miles (5 km) of occupied leks, or within identified nesting and brood-rearing habitats outside the 3-mile (5 km) perimeter (Connelly et al. 2000). (Northeast Wyoming Sage-Grouse Conservation Plan)

- Maintain summer maternity habitat. Avoid/minimize tree clearing that fragments large forested areas or tree lined corridors where possible. For example, route linear features along the edge of a woodlot instead of through the middle of it; use horizontal directional drilling for pipeline

crossings of wooded stream corridors and upland tree lines. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

Impact Analysis and Effects Determination
A summary of the travel management within the planning area can be found in the Buffalo RMP Revision in Section 3.6.5, the *Travel and Transportation Management* section in Chapter 3. This summary, the proposed management actions, and above Conservation Measures were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – No motorized vehicle use is allowed off designated routes within riparian/wetland areas, thereby protecting Ute ladies'-tresses orchid habitat. However, motorized vehicle use on roads and trails adjacent to riparian areas may lead to the spread of invasive species, reducing the suitability of the habitats for the Ute ladies'-tresses orchid. In addition, unauthorized trails in riparian areas and potential stream crossings could adversely impact the Ute ladies'-tresses orchid by altering the habitat. Implementing transportation and access management actions *may affect, not likely to adversely affect* the Ute ladies'-tresses orchid due to *discountable effects (NLAA-d)*. This determination is based on the prohibition of motorized vehicle use in Ute ladies'-tresses orchid habitats and existing conservation measures in place to protect this species.

Northern Long-Eared Bat – The northern long-eared bat has only been positively identified to occur in northeastern Campbell County. Approximately 18% of potential habitat identified by the USFWS overlays BLM administered surface lands in Campbell County; however, based on the distribution maps provided by WYNDD for the species, the likelihood that all of this habitat would be occupied by the species is minimal. WYNDD's predicted occurrence for the species only includes a small portion of forested habitat in northeast Campbell County. Because one individual bat was captured in the Spring Creek area, it is possible that the forested areas in close proximity to that area may also be occupied. Taking this into consideration, occupied habitat that may be affected is limited. Establishment of new public roads in areas occupied by the species may contribute to habitat loss and fragmentation, but not to a measurable extent as it is not a foreseeable activity. The suitable habitat in the area is dominated by steep hills and ridges where road construction would be difficult. BLM would be unlikely to propose constructing a public road through occupied special status species habitat. Motorized vehicle use, where authorized, is restricted to designated routes. Surveys and timing limitations associated with construction of new roads will mitigate effects that may occur during the spring and summer. New roads would be designed to avoid occupied habitat, and travel management plans limit travel to designated routes. Closing roads or limiting use could benefit the species by reducing disruptive activities in occupied habitats. Implementing actions associated with travel and transportation management *may affect, not likely to adversely affect (NLAA-i)* the northern long-eared bat. This determination is based on the low potential for projects to be located in areas occupied by the species, the existing safeguards for protection, and avoidance of special status species habitat.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Unauthorized use of motorized vehicles on federal lands could contribute to disturbance of soils, removal of vegetation, and the spread of invasive species. These actions could contribute to degradation of habitats for listed or proposed species.

Recreation

The Proposed RMP proposes the following management actions for recreation resources that benefit listed or proposed species:

- Open the planning area to dispersed recreation where consistent with other resource values. (Rec-6003)
- Avoid riparian habitat or develop and manage recreational sites, recreation facilities, and recreational access in a manner that minimizes impacts to riparian habitats. (Rec-6010)
- Prohibit dispersed camping and commercial camps within 200 feet of perennial surface water. (Rec-6011)
- Allow additional recreation facilities in areas where they are supported by recreational use and are consistent with other resource values. (Rec-6015)
- Divide the planning area into the following ERMAs (RMP Map 71): Cabin Canyon ERMA (1,369 acres), Face of the Bighorns/North Fork ERMA (34,477 acres), Gardner Mountain ERMA (55,181 acres), Kaycee Stockrest ERMA (2,685 acres), North Bighorns ERMA (2,926 acres), Powder River Basin ERMA (224,483 acres), Southern Bighorns ERMA (25,535 acres), and Walk-in Area ERMA (3,007 acres). (Rec-6017)
- Designate the following areas as SRMAs and delineate discrete recreation management zone boundaries: Burnt Hollow, Dry Creek Petrified Tree, Middle Fork Powder River, Mosier Gulch, Welch Ranch, Weston Hills, and Hole-in-the-Wall. (Rec-6018)
- Do not lease minerals within the boundary of the following SRMAs: Burnt Hollow, Dry Creek Petrified Tree, Middle Fork Powder River, Mosier Gulch, and Hole-in-the-Wall. Lease fluid minerals with a CSU stipulation to be consistent with SRMA management in the following SRMAs: Weston Hills. (Rec-6019)
- Allow surface disturbance within designated SRMAs for administrative use only, where consistent with other resource values. (Rec-6021)
- Recommend withdrawals from mineral entry under the mining laws in designated SRMAs. (Rec-6022)
- Allow salable mineral development within designated SRMAs for administrative use only. (Rec-6023)

Conservation Measures Specific to Recreation Management

The following are Conservation Measures, identified in BA Section 9, that may benefit listed or proposed species and are specific to recreation management:

- Recreational site development will not be authorized in known Ute ladies'-tresses orchid habitat. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)
- In order to conserve and protect natural areas, planned recreational foot trails are created to control human traffic. The BLM will create programs that will strive to protect the Ute ladies'-tresses habitat and prevent new trails from being constructed within 0.25 miles from known occurrences of the orchid. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Recreational foot trails that may be located adjacent to Ute ladies'-tresses orchid plant habitat should be constructed to reduce impacts to this species. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- BLM will avoid disturbing/injuring hibernating bats by:

  - Not entering Northern Long-Eared Bat hibernacula during the hibernation season, unless coordinated with the Service for survey, research, or other management purposes.

  - Complying with all cave and mine closures, advisories, and regulations.

  - Avoiding modifying cave or mine entrances that support hibernating bats. If there are safety concerns or concerns about bats (e.g., disturbance, vandalism) at a site, only "bat friendly" cave/mine gates will be installed.

  - BLM will minimize the spread of WNS. If a cave or mine that could harbor hibernating bats must be entered, and it does not have a cave and mine closure policy, BLM follow approved WNS decontamination protocols. Under no circumstances will clothing, footwear, or equipment that was used in a WNS-affected state or region be used. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

Impact Analysis and Effects Determination
A summary of the recreation management within the planning area can be found in the Buffalo RMP Revision in Section 3.6.6, the *Recreation* section of Chapter 3. This summary, the proposed management actions, and above Conservation Measures were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – No known populations of the Ute ladies'-tresses orchid occur near developed or proposed recreational sites (RMP Map 71). Extensive trail systems in riparian areas are not common due to the limited amount of riparian habitat on public surface within the planning area. Ute ladies'-tresses orchid may be indirectly impacted by the spread of invasive species from recreational actions. Invasive species may be spread by hikers and/or their vehicles, degrading potentially suitable Ute ladies'-tresses orchid habitats. Implementing recreational management actions *may affect, not likely to adversely affect* the Ute ladies'-tresses orchid due to *discountable effects (NLAA-d)*. This determination is based on the unlikely event of BLM-authorized actions occurring in Ute ladies'-tresses orchid habitats, the current absence of the species in the planning area, and the conservation strategies implemented if surface-disturbing activities were to occur in suitable habitats.

Northern Long-Eared Bat – The northern long-eared bat has only been positively identified to occur in northeastern Campbell County. Approximately 18% of potential habitat identified by the USFWS overlays BLM administered surface lands in Campbell County; however, based on the distribution maps provided by WYNDD for the species, the likelihood that all of this habitat would be occupied by the species is minimal. WYNDD's predicted occurrence for the species only includes a small portion of forested habitat in northeast Campbell County. Because one individual bat was captured in the Spring Creek area, it is possible that the forested areas in close proximity to that area may also be occupied. There are no caves present within Campbell County and therefore no hibernacula habitat. Most BLM surface lands where suitable habitat occurs are inaccessible for recreation by the general public. Under the management actions for recreation, Weston Hills and Burnt Hollow would both be designated as SRMAs (RMP Map 71). Development within these areas would be limited which would benefit the species by reducing

habitat loss, fragmentation and human disturbance. Casual human use in these areas would not be anticipated to affect the bat. Construction of foot or ATV trails may occur using chainsaws or heavy equipment; however, removal of trees in occupied habitat would be prohibited during sensitive periods such as summer roosting. Implementing recreational management actions *may affect, not likely to adversely affect (NLAA-i)* the species in the planning area due to beneficial and insignificant effects. This determination is based on the low potential for recreation to occur in most occupied habitat and the management actions to protect special status species.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Dispersed recreation on non-federal lands may impact listed or proposed species, especially if this action occurs in occupied habitats. However, these types of actions are anticipated to be localized in nature and dispersed throughout the planning area.

Lands with Wilderness Characteristics

Proposed Management Actions for Lands with Wilderness Characteristics
The Proposed RMP proposes the following management actions for Lands with Wilderness Characteristics resources that benefit listed or proposed species:

- Evaluate newly acquired lands, and other parcels meeting the size and naturalness requirements for wilderness characteristics. (LWC-6001)

- Manage Lands with Wilderness Characteristics to emphasize ecosystem health, natural values, and primitive recreational opportunities. (LWC-6002)

Conservation Measures Specific to Lands with Wilderness Characteristics
No conservation measures, identified in BA Section 9, that may benefit listed or proposed species are specific to Lands with Wilderness Characteristics.

Impact Analysis and Effects Determination
A summary of the Lands with Wilderness Characteristics within the planning area can be found in the Buffalo RMP Revision in Section 3.6.7, the *Lands with Wilderness Characteristics* section of Chapter 3. This summary and the proposed management actions were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – The Proposed RMP implements special management prescriptions for Lands with Wilderness Characteristics (6,864 acres) along the face of the Big Horn Mountains (RMP Map 74). This area does not contain suitable habitats for Ute ladies'-tresses orchids; therefore, *no effect (NE)* is anticipated to the Ute ladies'-tresses orchid.

Northern Long-Eared Bat – The Proposed RMP implements special management prescriptions for Lands with Wilderness Characteristics (6,864 acres) along the face of the Big Horn Mountains (RMP Map 74). This area is outside the range for the northern long-eared bat; therefore, *no effect (NE)* is anticipated to the species.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Development of Lands with Wilderness Characteristics may have adverse impacts on listed or proposed species if actions take place in occupied habitats.

Livestock Grazing Management

Proposed Management Actions for Livestock Grazing Management
The Buffalo Proposed RMP proposes the following management actions for livestock grazing that benefit listed or proposed species:

- Develop and implement appropriate livestock grazing management actions to achieve the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for the Public Lands Administered by the BLM in the State of Wyoming*, to provide watershed protection, to improve forage for livestock, forage and habitat for wildlife, and enhance rangeland health. (Grazing-6001)

- Continue to authorize appropriate amounts, kinds, and seasons of use. Grazing leases can adjust forage allocations, either increases or decreases, where supported by monitoring, field observations, rangeland health standards assessment results, or other data. (Grazing-6002)

- Continue implementation of existing Allotment Management Plans (AMPs). Develop and implement new AMPs with grazing lessees and other stakeholders to achieve desired resource goals and objectives. (Grazing-6004)

- Manage livestock grazing to sustain riparian, wetland, mountain mahogany, specials status species, or other special habitats. (Grazing-6005)

- Implement strategies that best protect rangeland resources during periods of drought. Cooperate with stakeholders for voluntary adjustments in livestock use. (Grazing-6009)

- Rest prescribed burn areas from livestock grazing prior to treatment when necessary to increase or maintain fuels for burning. (Grazing-6010)

- Restoration treatments may include actions to reduce or eliminate potential grazing impacts to meet regeneration objectives following forest management. (Grazing-6013)

- Manage Category M category allotments to achieve multiple resource health and objectives. (Grazing-6014)

- Develop range improvements in accordance with resource needs and livestock management. (Grazing-6015)

- Conduct baseline inventories. Develop, implement, and monitor AMPs. Base AMP goals/objectives in Category I and M allotments on resource protection and watershed health. (Grazing-6016)

- Allow livestock grazing on all public lands in the resource area except where an evaluation has determined it to be incompatible with other resource uses or values. (Grazing-6017)

- Permanent forage allocations would consider watershed protection, livestock grazing, wildlife habitat, and other resource values. Increases in vegetative production would be allocated for watershed protection first, then for forage and habitat. (Grazing-6018)

- Locate livestock salt or mineral supplements a minimum of 500 feet away from water sources, riparian areas, and aspen stands. (Grazing-6019)

- Designate and manage future Resource Reserve allotments as needed. Develop management criteria for the Resource Reserve allotments at the time of designation. (Grazing-6020)

- Provide rest/deferment from livestock grazing following wildfire, prescribed burns, and other vegetative treatments until resource objectives are met. (Grazing-6021)

Conservation Measure Specific to Livestock Grazing Management
The following are Conservation Measures, identified in BA Section 9, that may benefit listed or proposed species and are specific to livestock grazing management:

- Manage livestock grazing to protect special status plant populations (exclosures, timing). (SS Plants-4009)

- The BLM will collaborate with appropriate federal agencies, and the State of Wyoming as contemplated under Governor Executive Order 2013-3, to: (1) develop appropriate conservation objectives; (2) define a framework for evaluating situations where Greater Sage-Grouse conservation objectives are not being achieved on federal land, to determine if a causal relationship exists between improper grazing (by wildlife or livestock) and Greater Sage-Grouse conservation objectives; and (3) identify appropriate site-based action to achieve Greater Sage-Grouse conservation objectives within the framework. (SS WL-4010)

- The BLM will ensure that grazing management practices will restore, maintain, or improve plant communities. Grazing management strategies consider hydrology, physical attributes, and potential for the watershed and the ecological site. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- The BLM will ensure that 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 species, endangered species, species of special concern, or sensitive species will be maintained or enhanced. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- The BLM will ensure that grazing management practices will incorporate the kinds and amounts of use that will restore, maintain, or enhance habitats to assist in the recovery of federally threatened and endangered species or the conservation of federally-listed species of concern and other State-designated special status species. Grazing management practices will maintain existing habitat or facilitate vegetation change toward desired habitats. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Grazing will be intensively managed within known (Ute ladies'-tresses orchid) habitat containing populations from July through September, to allow plants to bloom and go to seed. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- The BLM will ensure the placement of mineral supplements, or new water sources (permanent or temporary), for livestock, wild horses, or wildlife at least one mile from known Ute ladies'-tresses populations. Supplemental feed for livestock or wildlife will not be authorized within one mile of known Ute ladies'-tresses orchid populations. Straw or other feed must be certified weed seed-free. These restrictions are intended to keep free-ranging livestock away from Ute ladies'-tresses populations and potential overgrazing of the areas occupied by the species. Surveys for Ute ladies'-tresses orchid will be conducted in potential Ute ladies'-tresses

habitat prior to livestock operations related construction projects. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- The BLM will not increase permitted livestock stocking levels in any allotment with pastures containing known Ute ladies'-tresses populations without consulting with the USFWS. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Livestock grazing, mowing/haying and some burning are specific management tools the BLM may use to maintain favorable habitat conditions for the orchid where feasible. Mowing and grazing, with proper timing and intensity, reduce the native and exotic plant competition for light and possibly for water, space, and nutrients. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

- Prescribed fire and grazing activities shall be coordinated between biologists, rangeland management specialists, and fire personnel to ensure that no damage occurs to the plant habitat when being used to maintain the habitat for the species. (BLM Wyoming Programmatic Statewide Ute Ladies'-Tresses Orchid BA)

- Work cooperatively with permittees, lessees and other landowners to develop grazing management strategies that integrate both public and private lands into single management units. (BLM IM 2012-044)

- Implement management actions (grazing decisions, AMP/Conservation Plan development, or other agreements) to modify grazing management to meet seasonal sage-grouse habitat requirements (Connelly et al. 2011). (BLM IM 2012-044)

- During drought periods, prioritize evaluating effects of the drought in priority sage-grouse habitat areas relative to their needs for food and cover. Since there is a lag in vegetation recovery following drought (Thurow and Taylor 1999; Cagney et al. 2010), ensure that post-drought management allows for vegetation recovery that meets sage-grouse needs in priority sage-grouse habitats. (BLM IM 2012-044)

- Any vegetation treatment plan must include pretreatment data on wildlife and habitat condition, establish non-grazing exclosures, and include long-term monitoring where treated areas are monitored for at least three years before grazing returns. Continue monitoring for five years after livestock are returned to the area, and compare to treated, ungrazed exclosures, as well as untreated areas. (BLM IM 2012-044)

- Reduce hot season grazing on riparian and meadow complexes to promote recovery or maintenance of appropriate vegetation and water quality. Utilize fencing/herding techniques or seasonal use or livestock distribution changes to reduce pressure on riparian or wet meadow vegetation used by sage-grouse in the hot season (summer) (Aldridge and Brighman 2002; Crawford et al. 2004; Hagen et al. 2007). (BLM IM 2012-044)

- Avoid grazing and trailing within lekking, nesting, brood-rearing, and winter habitats during periods of the year when these habitats are utilized by sage-grouse. (BLM IM 2012-044)

- Authorize new water development for diversion from spring or seep source only when sage-grouse habitat would benefit from the development. (BLM IM 2012-044)

- Design any new structural range improvements to conserve, enhance, or restore sage-grouse habitat through an improved grazing management system relative to sage-grouse objectives. (BLM IM 2012-044)
- Design all range projects in a manner that minimizes potential for invasive species establishment. Monitor for, and treat invasive species associated with existing range developments (Gelbard and Belnap 2003; Bergquist et al. 2007). (BLM IM 2012-044)
- Locate new livestock management facilities away from crucial breeding, brood-rearing and winter areas; or manage disturbance with seasonal restrictions. (BLM National Sage-Grouse Habitat Conservation Strategy)
- Where good habitat quality exists, maintain current management practices considering plant composition and soil type. (BLM National Sage-Grouse Habitat Conservation Strategy)
- Change mineral supplement and/or watering locations to move domestic livestock to desired areas. However, any change in location of supplement or watering location should consider potential effects to Greater Sage-Grouse habitat. (BLM National Sage-Grouse Habitat Conservation Strategy)
- Grazing use should be adjusted during extended drought periods. Consider transitioning back to pre-drought use when drought conditions have ended. (BLM National Sage-Grouse Habitat Conservation Strategy)
- Where other grazing management options are not achieving, or cannot achieve, the desired objectives, a short-term option may be livestock exclusion. (BLM National Sage-Grouse Habitat Conservation Strategy)
- In general, avoid yearlong and spring-to-fall continuous grazing schemes in sage-grouse habitat. Yearlong and spring-to-fall grazing may be a tool if it is not continued each year. (Northeast Wyoming Sage-Grouse Conservation Plan)
- Where appropriate, implement livestock grazing systems that provide for areas and times of rest or deferment. (Northeast Wyoming Sage-Grouse Conservation Plan)
- Where practicable, avoid heavy utilization of grazed pastures to compensate for rested pastures (a year of rest cannot compensate for a year of excessive use). (NE Wyoming Sage-Grouse Conservation Plan)
- Design grazing systems that provide sage-grouse habitat in riparian areas and around water sources. (Northeast Wyoming Sage-Grouse Conservation Plan)
- Manage stocking rates and rotations to maintain the health and productivity of rangelands for livestock and sage-grouse. Incorporate one of the monitoring programs from the Wyoming Rangeland Monitoring Guide to ensure proper grazing utilization and plant recovery. (Northeast Wyoming Sage-Grouse Conservation Plan)
- In pastures with riparian habitats (assuming riparian vegetation is actively growing), manage livestock grazing to allow herbaceous vegetation recovery. (Northeast Wyoming Sage-Grouse Conservation Plan)
- New spring developments in sage-grouse habitat should be designed to maintain or enhance the free-flowing characteristics of springs and wet meadows with the use of float valves on troughs

or other features where feasible. Spring and wet meadows should be protected from over utilization and trampling by livestock. (Northeast Wyoming Sage-Grouse Conservation Plan)

Impact Analysis and Effects Determination
A summary of the livestock grazing management within the planning area can be found in the Buffalo RMP Revision in Section 3.6.8, the *Livestock Grazing Management* section of Chapter 3. This summary, the proposed management actions, and above Conservation Measures were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – Livestock grazing in riparian areas could increase soil erosion, stream bank degradation, and the spread of invasive species; however, implementing the *Standards for Healthy Rangelands* will reduce these impacts. Livestock grazing may adversely impact the Ute ladies'-tresses orchid by foraging and trampling individual plants. The USFWS has determined that the foraging and trampling of individual plants by livestock may harm or reduce an individual plant's fitness or survival. Fencing, development of alternative water supplies for livestock, herding, placing feed and mineral supplements away from water sources, and adjusting pasture boundaries and season of use will minimize the impacts to riparian areas. Implementing livestock grazing management actions *may affect, likely to adversely affect (LAA)* the Ute ladies'-tresses orchid. This determination is based on the potential for range management actions to occur within orchid habitat and result in destruction of individuals by grazing or trampling. Livestock grazing in some riparian areas may produce beneficial effects on orchid habitat, however, by reducing competing vegetation.

Northern Long-Eared Bat – The northern long-eared bat has only been positively identified to occur in northeastern Campbell County. Approximately 18% of potential habitat identified by the USFWS overlays BLM administered surface lands in Campbell County; however, based on the distribution maps provided by WYNDD for the species, the likelihood that all of this habitat would be occupied by the species is minimal. WYNDD's predicted occurrence for the species only includes a small portion of forested habitat in northeast Campbell County. Because one individual bat was captured in the Spring Creek area, it is possible that the forested areas in close proximity to that area may also be occupied. Taking this into consideration, occupied habitat that may be affected is limited. Grazing of livestock is not anticipated to have an effect on the species. Bats are likely to utilize water developments near roosting and foraging habitat. The BLM typically discourages placement of water developments on BLM-administered surface due to the majority of lands within allotments typically being privately owned lands. If these developments occur on BLM surface, they will be designed to eliminate mortality risks to wildlife. Stock tanks near suitable habitat would be designed to be easily accessed by bats and equipped with wildlife escape ramps. Additional water sources in occupied habitat may benefit the species. Suitable habitat in the planning area is extremely limited and water developments that pose mortality risks will not occur on BLM-administered surface lands. Therefore, implementing grazing management actions *may affect, not likely to adversely affect (NLAA-i)* on the northern long-eared bat due to insignificant effects. This determination is based on the potential benefits of range improvements and application of protection measures to avoid adverse impacts.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Livestock grazing on private lands may adversely affect listed or proposed species. Grazing in riparian areas could impact stream bank stability, trample vegetation, and increase sedimentation, all of which could adversely impact listed or proposed species that occur in these habitats. Livestock grazing in suitable habitat on non-federal lands could adversely impact these species.

Special Designations - Areas of Critical Environmental Concern

Proposed Management Actions for Areas of Critical Environmental Concern
The Proposed RMP proposes the following protection for ACECs and Other Management Areas that benefit listed or proposed species:

- Designate as appropriate, the following proposed ACECs: Pumpkin Buttes and Welch Ranch. (ACEC-7003)

Conservation Measures Specific to Areas of Critical Environmental Concern
No conservation measures, identified in BA Section 9, that may benefit listed or proposed species are specific to ACECs.

Impact Analysis and Effects Determination
A summary of the ACECs within the planning area can be found in the Buffalo RMP Revision in Section 3.7.1, the *ACEC* section of Chapter 3. This summary and the proposed management actions were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – Management of ACECs is not anticipated to detrimentally impact Ute ladies'-tresses orchid or their habitats. Management of these areas may have beneficial effects on Ute ladies'-tresses orchid due to access restrictions, limitations on surface disturbance, and management objectives specifically designed to benefit the resources contained within. Implementing ACEC management actions *may affect, not likely to adversely affect* Ute ladies'-tresses orchid due to *beneficial effects (NLAA-b)*. This determination is based on the expansion of the orchid's habitat protection.

Northern Long-Eared Bat – Areas proposed for designation as ACEC (RMP Map 74) do not overlap with suitable habitat for the northern long-eared bat; therefore, *no effect (NE)* is anticipated to the species.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. No actions associated with ACECs on non-federal lands are anticipated to affect listed or proposed species.

Special Designations – Scenic or Back Country Byways

Proposed Management Actions for Scenic or Back Country Byways
The Proposed RMP proposes the following protections for scenic or back country byways that benefit listed or proposed species:

- Manage byways with the objective of encouraging responsible motorized recreational use of the proposed byway, while protecting and displaying the scenic, cultural, geologic, multiple use, and crucial wildlife habitat values that occur in the area. (BCB-7001)

Conservation Measures Specific to Scenic or Back Country Byways
No conservation measures, identified in BA Section 9, that may benefit listed or proposed species are specific to scenic or back country byways.

Impact Analysis and Effects Determination
A summary of the scenic or back country byways within the planning area can be found in the Buffalo RMP Revision in Section 3.7.2, the *Scenic or Back Country Byways* section of Chapter

3. This summary and the proposed management actions were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – Management of National Back Country Byways is not anticipated to impact Ute ladies'-tresses orchid or their habitats. The Proposed RMP would evaluate roads in coordination with the counties and other stakeholders. Potential routes include Hazelton Road, Slip Road, Trabing/Sussex, Powder River, Rome Hill, and Tipperary/Thompson Road (RMP Map 74). Implementing National Back Country Byways management actions *may affect, not likely to adversely affect* Ute ladies'-tresses orchid due to *beneficial effects (NLAA-b)*. This determination is based on the expansion of Ute ladies'-tresses habitat protection.

Northern Long-Eared Bat – Areas evaluated for scenic or back country byways (RMP Map 74) do not overlap with suitable habitat for the northern long-eared bat; therefore, *no effect (NE)* is anticipated to the species.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. No actions associated with National Back Country Byways on non-federal lands are anticipated to affect listed or proposed species.

Special Designations - Wild and Scenic Rivers

Proposed Management Actions for Wild and Scenic Rivers
The Proposed RMP proposes the following protections for WSRs that benefit listed or proposed species:

- Manage the Middle Fork Powder River in accordance with the Middle Fork Interim Management Plan until Congress acts upon the nomination. (WSR-7001)
- If Congress denies the Middle Fork Powder River WSR nomination, management will continue to retain the free-flowing characteristics and outstanding resource values. (WSR-7003)

Conservation Measure Specific to Wild and Scenic Rivers
The following is a Conservation Measure, identified in BA Section 9, that may benefit listed or proposed species and is specific to WSRs:

- Recreational site development will not be authorized in known Ute ladies'-tresses orchid habitat. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA)

Impact Analysis and Effects Determination
A summary of the WSRs within the planning area can be found in the Buffalo RMP Revision in Section 3.7.3, the *Wild and Scenic Rivers* section of Chapter 3. This summary, the proposed management actions, and above Conservation Measures were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – Though the Proposed RMP does implement special management prescriptions for WSRs, Congress is unlikely to act on the nomination; therefore, *no effect (NE)* is anticipated to the Ute ladies'-tresses orchid.

Northern Long-Eared Bat – The Middle Fork Powder River is the only segment that has been nominated for designation as a WSR (RMP Map 75). It does not overlap with suitable habitat for the northern long-eared bat; therefore, *no effect (NE)* is anticipated to the species.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. No actions associated with WSRs on non-federal lands are anticipated to affect listed or proposed species. The eligible river segment, Middle Fork Powder River, is a headwater segment with little non-federal land above it.

Special Designations - Wilderness Study Areas

Proposed Management Actions for Wilderness Study Areas
The Proposed RMP proposes the following protections for WSAs that benefit listed or proposed species:

- If Congress acts on the WSAs (Fortification Creek, Gardner Mountain, North Fork), the RMP will be amended if necessary. (WSA-7001)
- Manage WSAs for the preservation of natural conditions and processes, and to provide opportunities for solitude or a primitive and unconfined type of recreation. (WSA-7002)
- If Congress decides not to designate a WSA as wilderness, manage to emphasize healthy ecosystems, opportunities for solitude, and primitive recreation. (WSA-7003)
- Prohibit all motorized and mechanized equipment within WSAs. (WSA-7004)

Conservation Measure Specific to Wilderness Study Areas
No conservation measures, identified in BA Section 9, that may benefit listed or proposed species are specific to WSAs.

Impact Analysis and Effects Determination
A summary of the WSAs within the planning area can be found in the Buffalo RMP Revision in Section 3.7.4, the *Wilderness Study Areas* section of Chapter 3. This summary and the proposed management actions were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – Management of WSAs is not anticipated to impact Ute ladies'-tresses orchids or their habitats. The WSA designation is beneficial to the protection of air and watersheds, soil and water quality, ecological stability, plant and animal gene pools, and habitats for wildlife. Management of these areas may have beneficial effects on Ute ladies'-tresses orchids due to access restrictions, limitations on surface disturbance, and management objectives specifically designed to benefit the resources contained within. Implementing WSA management actions will have *no effect (NE)* on Ute ladies'-tresses orchids as habitat does not exist within these areas.

Northern Long-Eared Bat – No areas designated as WSAs (RMP Map 75) overlap with suitable habitat for the northern long-eared bat; therefore, *no effect (NE)* is anticipated to the species.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. No actions associated with WSAs on non-federal lands are anticipated to affect listed or proposed species.

Socioeconomic Resources - Social and Economic

Proposed Management Actions for Social and Economic Resources
The Proposed RMP does not propose management actions for socioeconomic resources that may benefit listed or proposed species.

Conservation Measure Specific to Social and Economic Resources
No conservation measures, identified in BA Section 9, that may benefit listed or proposed species are specific to socioeconomic resources.

Impact Analysis and Effects Determination
A summary of the social and economic resources within the planning area can be found in the Buffalo RMP Revision in Section 3.8.1, the *Social Conditions* and 3.8.2, *Economic Conditions* sections of Chapter 3. This summary was taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – Socioeconomic resources are not anticipated to impact Ute ladies'-tresses orchids or their habitats. The Proposed RMP would result in a slight decrease in job opportunities associated with decreased development of oil and gas resources and, therefore, may result in a slight decrease in population, which may benefit listed species. The Proposed RMP would result in some beneficial impacts to air quality, wildlife, and other resources that improve quality of life related to natural characteristics. Implementing socioeconomic resources will have *no effect (NE)* on Ute ladies-tresses orchids. This determination is based on the lack of specific action in the Proposed RMP related to socioeconomic resources.

Northern Long-Eared Bat – Suitable habitat for northern long-eared bat is limited to small portions of northern Campbell County. Management actions for socioeconomic resources are largely administrative in nature, and are not anticipated to impact the northern long-eared bat or their habitat. The Proposed RMP would result in a slight decrease in job opportunities associated with decreased development of oil and gas resources and, therefore, may result in a slight decrease in population, which may benefit listed species. The Proposed RMP would result in some beneficial impacts to air quality, wildlife, and other resources that improve quality of life related to natural characteristics. Implementing management actions for socioeconomic resources will have *no effect (NE)* on northern long-eared bat.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Housing developments could expand into listed or proposed species habitats. Housing developments could remove, degrade, or fragment habitats for these species.

Socioeconomic Resources – Health and Safety

Proposed Management Actions for Health and Safety
The Proposed RMP proposes the following protections for health and safety resources that benefit listed or proposed species:

- Identify, report, control, and mitigate imminent and potential hazards or threats to human health and/or the environment from hazardous substance releases and physical hazards. (Health-8001)

- Manage the cleanup of hazardous substance and other contaminant spills and releases to reduce human health and/or environmental risk, reclaim and monitor contaminated lands, and carry out emergency response activities. (Health-8002)

- Identify and prioritize abandoned mine sites for reclamation that most affect human health or safety, and the environment. (Health-8003)

- Ensure appropriate review of BLM-authorized activities and the application of effective management controls to minimize hazardous substance and other contaminant spills, releases, and physical hazards. (Health-8005)

- Reduce waste produced by BLM activities and from authorized uses of public lands through waste minimization practices that promote reducing, reusing, recycling, substituting, and other innovative methods of pollution prevention. (Health-8006)

- Identify, monitor, and mitigate hazards to public health and safety from coalbed fires. (Health-8007)

Conservation Measure Specific to Health and Safety
The following is a Conservation Measure, identified in BA Section 9, that may benefit listed or proposed species and is specific to Health and Safety:

- To avoid/minimize alterations of clean drinking water and foraging areas BLM will follow available standards on spill prevention, containment, and control. (Northern Long-Eared Bat Interim Conference and Planning Guidance)

Impact Analysis and Effects Determination
A summary of the health and safety within the planning area can be found in the Buffalo RMP Revision in Section 3.8.3, the *Health and Safety* sections of Chapter 3. This summary and the proposed management actions were taken into consideration for the impact analysis and effects determinations.

Ute Ladies'-Tresses Orchid – Where needed, warning signs and protective fencing would be erected in hazardous waste sites. Typically signage and fencing for health and safety do not take place in riparian habitat, but the construction and maintenance of signs and fencing could conceivably cause disturbance to potential Ute ladies'-tresses orchid habitat. However, these effects will be localized. Additionally, these actions are meant to prevent Ute ladies'-tresses orchid habitat from becoming contaminated. Implementing health and safety management actions *may affect, not likely to adversely affect* the Ute ladies'-tresses orchid due to *discountable effects (NLAA-d)*.

Northern Long-Eared Bat – Protection of the environment from hazardous substances would benefit the northern long-eared bat and their habitat. Reclaiming abandoned mines could reduce potential winter habitat for the species; however, no underground mines are presently known to occur in Campbell County, and no hibernacula have been identified in Wyoming. Implementing health and safety management actions *may affect, not likely to adversely affect (NLAA-d)* the species in the planning area due to beneficial and discountable effects. This determination is based on the low potential for health and safety threats to be present in most occupied habitat, the management actions to protect special status species, and the unlikelihood that underground mines are present in Campbell County.

Cumulative Effects – Cumulative effects include future state, tribal, local, or private actions reasonably certain to occur in the planning area. Disposal or an accidental spill of hazardous materials on non-federal land could be detrimental to listed or proposed species if the disposal or spill occurred in or adjacent to their habitats.

I.7. Summary of Cumulative Effects

Cumulative effects are the collective incremental impacts of the Proposed RMP regardless of the entity undertaking the action. Cumulative effects include future state, tribal, local, or private actions that are reasonably certain to occur in the planning area. Future federal actions that are unrelated to the Proposed Plan are not considered because they require separate consultation pursuant to section 7 of the ESA.

Surface-disturbing and other disruptive activities that occur on non-BLM-administered lands are not subject to the restrictions designed to protect wildlife habitat on BLM-administered lands and therefore may increase the cumulative impacts on wildlife habitat. Non-federal actions that may affect listed or proposed species or their habitats in the planning area include:

- Increased residential development may contribute to a reduction of suitable habitat for listed or proposed species through degradation, removal, and fragmentation of habitat, including additional sediment loading of waterways.

- An expanded network of roads on state and private lands will impact listed or proposed species habitat through the fragmentation or direct loss of habitats.

- Fragmentation, loss, or degradation of listed or proposed species habitat due to the infrastructure associated with urban expansion and mineral development including pipelines and powerlines.

- Fragmentation, loss, or degradation of listed or proposed species habitat, and direct mortality threat, due to the infrastructure associated with renewable energy development including wind turbines and distribution lines.

- Spread of invasive species on state and private lands throughout the planning area.

- Actions by private landowners that impact the health of wetland/riparian areas and their performance of critical water quality protection functions, and actions that remove forested habitats.

- Surface-disturbing activities caused by mineral and other development, the construction and maintenance of ROWs, and vegetation treatments (e.g., prescribed burns and mechanical fuels treatments) on state and private lands contribute to short- or long-term losses of vegetation and increased sedimentation.

- Surface disturbance associated with oil and gas development including permanent facilities such as roads and well pads.

- Surface disturbance associated with salable and locatable mineral development that may remove habitat for Threatened and Endangered species.

I.8. Summary of Effects Determinations

Table I.3. Summary of Effects Determinations

Biological Assessment on the Effects of BLM Management Actions Within the Planning Area on Species Listed Under the ESA	Ute Ladies'-Tresses Orchid	Northern Long-Eared Bat
Physical Resources		
Air Quality	NE	NLAA-i
Soil	NLAA-b	NLAA-i
Water	NLAA-d	NLAA-d
Cave and Karst Resources	NE	NE
Mineral Resources		
Mineral Resources – Locatable	NLAA-d	NLAA-d
Leasable Minerals – Coal	LAA	NLAA-i
Leasable Minerals – Oil and Gas	LAA	NLAA-d
Salable	NLAA-d	NLAA-i
Fire and Fuels Management		
Fire and Fuels Management (Wildfire)	NLAA-d	LAA
Fire and Fuels Management (Prescribed Fire)	NLAA-d	NLAA-d
Biological Resources		
Forests and Woodlands	NE	NLAA-i
Grassland and Shrubland Communities	NE	NE
Riparian/Wetland Resources	LAA	NLAA-b
Invasive Species and Pest Management	NLAA-d	NLAA-i
Fish and Wildlife Resources	NLAA-b	NLAA-b
Special Status Species (Plants)	NLAA-b	NE
Special Status Species (Fish and Wildlife)	NLAA-b	NLAA-b
Heritage and Visual Resources		
Cultural Resources	NLAA-d	NLAA-d
Paleontological Resources	NLAA-d	NLAA-d
Visual Resource Management	NLAA-d	NLAA-i
Land Resources		
Forest Products	NE	NLAA-d
Lands and Realty	NLAA-d	NLAA-d
Renewable Energy	NLAA-d	NLAA-d
Rights-of-Way Corridors	NLAA-d	NLAA-d
Travel and Transportation Management	NLAA-d	NLAA-i
Recreation	NLAA-d	NLAA-i
Non-Wilderness Study Area Lands with Wilderness Characteristics	NE	NE
Livestock Grazing Management	LAA	NLAA-i
Special Designations		
ACECs	NLAA-b	NE
National Back Country Byways	NLAA-b	NE
Wild and Scenic Rivers	NE	NE
Wilderness Study Areas	NE	NE
Social and Economic Resources		

Biological Assessment on the Effects of BLM Management Actions Within the Planning Area on Species Listed Under the ESA	Ute Ladies'-Tresses Orchid	Northern Long-Eared Bat
Socioeconomic	NE	NE
Health and Safety	NLAA-d	NLAA-d
NLAA-b-i-d – May affect, not likely to adversely affect due to beneficial, insignificant, or discountable effects LAA – May affect, is likely to adversely affect NE – No effect NLJ – May affect, not likely to jeopardize the continued existence of the species LJ – May affect, likely to jeopardize the continued existence of the species NI – No Impact BLM – Bureau of Land Management ESA – Endangered Species Act ACEC – Area of Critical Environmental Concern		

I.9. Conservation Measures

Implementing the following conservation measures is intended to minimize adverse effects that are likely to result from implementing the management actions identified for the RMP. This section describes (1) proposed protections in the Proposed RMP specific to listed or proposed species conservation, and (2) conservation measures for Buffalo planning area listed or proposed species from other sources. Proposed protections in the Proposed RMP designed for other resources but that also benefit listed or proposed species are identified in Section 6 for the resource for which the protection was designed. The BLM will also consider implementing any appropriate BMPs to further protect the species and its habitat. In the event new populations of the species are discovered, these measures will apply until such time that further investigation and subsequent consultation with the USFWS result in more appropriate management prescriptions.

I.9.1. Proposed Protections under the Proposed RMP

- Implement actions set forth in recovery plans, conservation measures, terms and conditions, and appropriate BMPs and reasonable and prudent measures within BOs for Threatened and/or Endangered plant species. (SS Plants-4001)
- Allow treatments within habitat for special status plant species and within known populations that are proven to benefit the species. (SS Plants-4002)
- Allow the following within habitat for special status plant species, though not within known populations: surface-disturbing activities that could adversely impact special status plant species, mineral exploration and development activities, motor vehicle use, including uses related to fire suppression and geophysical exploration activities (surveying, etc.), use of explosives and blasting, and placement of water developments, salt and mineral supplements. (SS Plants-4003)
- Require predisturbance flowering season surveys for special status plant species prior to approving any project or activity that may impact the habitat for these species as modeled and surveyed by WYNDD and BLM. A mitigation and monitoring plan is to be developed within occupied habitat. (SS Plants-4004)
- Allow aerial application of narrow spectrum herbicide treatments within areas containing special status plant species. (SS Plants-4005)

- Allow the use of fire suppression chemicals, including foaming agents and surfactants, within areas of known special status plant populations where consistent with the biology of the plant or where human safety or property are at risk. (SS Plants-4006)
- Allow ROWs within areas containing habitat for special status species plants, though not within areas of known populations. (SS Plants-4007)
- Apply a CSU stipulation to mineral leases within habitat for special status plant species. Require necessary surveys and establish site specific buffer. Apply an NSO stipulation to fluid mineral leases within known special status plant populations. (SS Plants-4008)
- Manage livestock grazing to protect special status plant populations (exclosures, timing). (SS Plants-4009)
- Prohibit new surface-disturbing activities within 0.25 mile of any waters containing special status fish species unless it benefits the species. Exceptions must demonstrate the proposed impacts cannot be avoided and the proposal is the least environmentally damaging alternative. (SS Fish-4007)
- Apply an NSO stipulation within 0.25 mile of any waters containing special status fish species. (SS Fish-4008)
- Utilize current research, management and conservation plans, and similar related documents to guide special status species habitat management. (SS WL-4001)
- Implement actions set forth in recovery plans, conservation measures, terms and conditions, protection measures, and appropriate BMPs and reasonable and prudent measures within BOs for Threatened and/or Endangered wildlife species, including those specific to this RMP and any future statewide programmatic BOs. (SS WL-4002)
- Maintain (size and quality) or enhance current habitat utilized by special status species. Enlarge/restore habitat on site specific basis. (SS WL-4003)
- Maintain or enhance the integrity of identified special status wildlife species migration corridors. Manage identified special status wildlife species travel corridors consistent with other resource values. (SS WL-4004)
- Locate and manage facilities to mitigate noise impacts on special status species. (SS WL-4005)
- Manage surface-disturbing and disruptive activities to mitigate impacts on special status wildlife species and their habitats. (SS WL-4006)
- Apply a CSU stipulation to mineral leases containing special status species habitat. Surveys required for clearance. (SS WL-4007)
- The BLM will collaborate with appropriate federal agencies, and the State of Wyoming as contemplated under Governor Executive Order 2013-3, to: (1) develop appropriate conservation objectives; (2) define a framework for evaluating situations where Greater Sage-Grouse conservation objectives are not being achieved on federal land, to determine if a causal relationship exists between improper grazing (by wildlife or livestock) and Greater Sage-Grouse conservation objectives; and (3) identify appropriate site-based action to achieve Greater Sage-Grouse conservation objectives within the framework. (SS WL-4010)

- Develop avoidance areas restricting the application of broad-spectrum pesticides in areas containing Greater Sage-Grouse nesting and brood-rearing habitats. (SS WL-4011)
- Restore Greater Sage-Grouse brood-rearing habitats in riparian/wetland areas. Maintain seeps, springs, wet meadows, and riparian vegetation in a functional and diverse condition for young Greater Sage-Grouse and other species that depend on forbs and insects associated with these areas. (SS WL-4012)
- Minimize disturbances that would result in alterations to springs and riparian Greater Sage-Grouse habitat. In coordination with stakeholders, develop alternative water sources to replace natural sources that have been affected or destroyed. (SS WL-4014)
- Design and locate fences to reduce impacts to important Greater Sage-Grouse habitat. (SS WL-4017)
- Allow surface disturbance and occupancy within the USFWS recommended biologic buffer zone around active raptor nests when nest productivity would not be harmed. (WL-4027 and SS WL-4030)
- Prohibit surface-disturbing activities potentially disruptive to nesting raptors within USFWS recommended spatial buffers and seasonal dates for active raptor nests. (WL-4029 and SS WL-4029)
- Require surveys for special status amphibian, reptile, and bat species prior to approving any project or activity that may impact the habitat for these species. Habitat includes: caves, mature forest, perennial waters, vernal pools, playas, wetlands, and south-facing rock outcrops. Allow surface-disturbing and disruptive activities within 1,640 feet (500 meters) of caves, mature forest, perennial waters, vernal pools, playas, wetlands, and south facing rock outcrops when special status amphibian, reptile, and bat species populations and habitat can be conserved. (SS WL-4033)
- Require surveys for special status amphibian, reptile, and bat species prior to approving any project or activity that may impact the habitat for these species. Habitat includes: caves, mature forest, perennial waters, vernal pools, playas, wetlands, and south-facing rock outcrops. Apply a CSU stipulation to fluid mineral leases for the protection of special status amphibian, reptile, and bat species and their habitats within 1,640 feet (500 meters) of caves, mature forest, perennial waters, vernal pools, playas, wetlands, and south facing rock outcrops. (SS WL-4034)

I.9.2. Conservation Measures from Other Sources

BLM Wyoming: Statewide Programmatic Biological Assessment: Ute Ladies'-Tresses Orchid (*Spiranthes diluvialis*)

Conservation Measures Committed to by BLM

1. The Wyoming BLM Standard Mitigation Guidelines for Surface Disturbing Activities requires any lessee or permittee to conduct inventories or studies in accordance with BLM and USFWS guidelines to verify the presence or absence of threatened or endangered species before any activities can begin on site. In the event the presence of one or more of these species is verified, the operation plans of a proposed action will be modified to include the protection of the species and its habitat, as necessary. Possible protective measures

may include seasonal or activity limitations, or other surface management and occupancy constraints (BLM 1990).

- Surface disturbance will be prohibited within 500 feet of surface water and/or riparian areas. Exception, waiver, or modification of this limitation may be approved in writing, including documented supporting analysis, by the authorized officer. (Wyoming BLM Mitigation Guidelines for Surface-disturbing and Disruptive Activities). **Note**: this conservation measure was revised from the programmatic BA by adding the second sentence to clarify that exception, waiver, or modifications from the prohibition are possible.

- NSO will be allowed within special management areas (e.g., known threatened or endangered species habitat) (Wyoming BLM Mitigation Guidelines for Surface-disturbing and Disruptive Activities).

- Portions of the authorized use area are known or suspected to be essential habitat for threatened or endangered species. Prior to conducting any onsite activities, the lessee/permittee will be required to conduct inventories or studies in accordance with BLM and USFWS guidelines to verify the presence or absence of this species. In the event that an occurrence is identified, the lessee/permittee will be required to modify operational plans to include the protection requirements of this species and its habitat (e.g., seasonal use restrictions, occupancy limitations, facility design modifications) (Wyoming BLM Mitigation Guidelines for Surface-disturbing and Disruptive Activities).

2. Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for the Public Lands Administered by the Bureau of Land Management in the State of Wyoming, Specifically:

   - 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.

     Grazing management practices will restore, maintain, or improve plant communities. Grazing management strategies consider hydrology, physical attributes, and potential for the watershed and the ecological site (BLM Wyoming Guidelines for Livestock Grazing Management).

   - Standard 3 - Upland vegetation on each ecological site consists of plant communities appropriate to the site which 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 species, endangered species, species of special concern, or sensitive species will be maintained or enhanced.

     Grazing management practices will incorporate the kinds and amounts of use that will restore, maintain, or enhance habitats to assist in the recovery of federal threatened and endangered species or the conservation of federally-listed species of concern and other state-designated special status species. Grazing management practices will maintain existing habitat or facilitate vegetation change toward desired habitats. Grazing

management will consider threatened and endangered species and their habitats (BLM Wyoming Guidelines for Livestock Grazing Management).

3. The BLM will maintain biological diversity of plant and animal species; support WGFD strategic plan population objective levels to the extent practical and to the extent consistent with BLM multiple use management requirements; maintain, and where possible, improve forage production and quality of rangelands, fisheries, and wildlife habitat; and to the extent possible, provide habitat for threatened and endangered and special status plant and animal species on all public lands in compliance with the ESA and approved recovery plans (Buffalo RMP, p. 33).

4. In any proposed new access, wetland and riparian areas will be avoided where possible (18 CFR 725.2 – Floodplain Management and Protection of Wetlands).

5. Place mineral supplements, new water sources (permanent or temporary), or supplemental feed for livestock for livestock, wild horses, or wildlife at least 1.0 mile from known orchid populations. Hay or other feed and straw must be certified weed-free. These restrictions are intended to keep free-ranging livestock away from populations of the orchid and subsequent grazing on individual orchid plants. Surveys for the orchid will be conducted in potential orchid habitat prior to livestock operations projects. Placement of mineral supplements, straw or other feed for livestock within 1.0 mile of known populations of the orchid will be evaluated and approved by the BLM with concurrence by USFWS and implemented on a case-by-case basis only.

6. The BLM will not increase permitted livestock stocking levels in any allotment with pastures containing known orchid populations without consulting with the USFWS. It is unknown to what extent overall impacts due to livestock grazing have on the orchid, whether it is detrimental due to actual grazing and trampling of plants or beneficial due to livestock removal of adjacent competing vegetation.

7. Grazing will be intensively managed within known habitat containing populations from July through September, to allow plants to bloom and go to seed.

8. Recreational site development will not be authorized in known Ute ladies'-tresses habitat.

9. The Bureau will manage stream habitats to retain, re-create, or mimic natural hydrology, water quality, and related vegetation dynamics. Projects that may alter natural hydrology or water quality, change the vegetation of the riparian ecosystem and cause direct ground disturbance will be evaluated and redesigned to ensure that adverse effects to populations of the orchid do not occur.

10. Biological control of noxious plant species will be prohibited within 1.0 mile from known orchid habitat until the impact of the control agent has been fully evaluated and determined not to adversely affect the plant population. BLM will monitor biological control vectors.

11. Except in cases of extreme ecological health (insect or weed outbreaks/infestations), herbicide treatment of noxious plants/weeds will be prohibited within 0.25 mile of known populations of the Ute ladies'-tresses orchid unless it is a narrow spectrum herbicide that would not harm the Ute ladies'-tresses orchid (herbicides specific to dicots) and insecticide/pesticide treatments will be prohibited within 1.0 mile of known populations of the orchid to protect pollinators.

Where insect or weed outbreaks have the potential to degrade area ecological health inside the buffers listed above, at the discretion of the BLM's authorized officer and with concurrence by the USFWS, the following will apply: where needed, and only on a case-by-case basis, a pesticide use proposal or other site specific plan will address concerns of proper timing, methods of use, and chemicals. Pesticides specifics to dicots will be preferred where these are adequate to control the noxious weeds present.

Aerial application of herbicides will be carefully planned to prevent drift in areas near known populations of the orchid (outside of the 0.25 mile buffer). The BLM will work with the Animal and Plant Health Inspection Service (APHIS), the USFWS and County Weed and Pest Agencies to select pesticides and methods of application that will most effectively manage the infestation and least affect the orchid. (BLM Wyoming Statewide Programmatic Ute Ladies'-Tresses Orchid BA) **Note**: The conservation measure was modified from the programmatic BA measure to allow the use of narrow spectrum herbicides when it has been determined that they would not harm the Ute ladies'-tresses orchid.

12. If revegetation projects are conducted within 0.25 miles of known habitat for the orchid, only native species will be selected. This conservation measure will keep non-native species from competing with the orchid.

13. Limit the use of off road vehicles (OHVs) to designated roads and trails within 0.5 mile of known populations of the orchid, with no exceptions for the "performance of necessary tasks" other than firefighting and hazardous material cleanup allowed using vehicles off of highways. No OHV competitive events will be allowed within 1.0 mile of known populations of the orchid. Roads that have the potential to impact the orchid and are not required for routine operations or maintenance of developed projects, or lead to abandoned projects will be reclaimed as directed by the BLM.

14. Apply a COA on all APDs oil and gas wells for sites within 0.25 miles of any known populations of the orchid. This condition will prohibit all authorized surface disturbance and OHV travel from sites containing populations of the orchid. Operations outside of the 0.25 mile buffer of orchid populations, such as "directional drilling" to reach oil or gas resources underneath the orchid's habitat, would be acceptable.

15. For known Ute ladies'-tresses populations, the BLM will place a CSU stipulation prohibiting all surface disturbances on new oil and gas leases, buffering the area within 0.25 miles of known Ute ladies'-tresses populations. For existing oil and gas leases with known Ute ladies'-tresses populations (these would be for newly discovered populations not currently documented), the Bureau will require the COA in conservation measure 14 above including the same 0.25 mile buffer area around those known Ute ladies'-tresses populations.

16. Prohibit the sale and disposal of salable minerals in habitat containing known populations of the orchid (within a 0.25 mile buffer area of known orchid populations), and where possible pursue acquisition of property with known populations of the orchid with salable minerals. The disposal (sale and removal) of salable minerals is a discretionary BLM action and is prohibited within a 0.25 mile buffer area of known populations of the orchid.

17. To prevent loss of habitat for the orchid, the BLM "shall retain in Federal ownership all habitats essential for the survival and recovery of any listed species, including habitat that was used historically, that has retained its potential to sustain listed species, and is deemed to be essential to their survival" (BLM 2001). Prior to any land tenure adjustments in known

habitat for the orchid, the BLM will survey to assess the habitat boundary and retain that area in federal ownership. BLM-administered public lands that contain identified habitat for the orchid will not be exchanged or sold, unless it benefits the species.

18. All proposed ROW projects (powerlines, pipelines, roads, etc.) will be designed and locations selected at least 0.25 miles from any known orchid habitat to minimize disturbances. ROW actions for roads, powerlines, pipelines, etc. will avoid occupied habitat for the orchid. If avoidance of adverse effects is not possible, the Bureau will re-initiate consultation with the Service.

19. All proposed projects will be designed and locations selected to minimize disturbances to known populations of the orchid, and if the avoidance of adverse affects is not possible, the BLM will re-initiate consultation with the USFWS. Projects will not be authorized closer than

    0.25 miles from any known populations of the orchid without concurrence of the USFWS and the BLM authorized officer. No ground disturbing construction activities will be authorized within 0.25 miles of any known populations of the orchid during the essential growing season time period (from July to September, the growing, flowering and fruiting stages) to reduce impacts to this species.

20. In order to conserve and protect natural areas, planned recreational foot trails are created to control human traffic. BLM will create programs that will strive to protect the orchid's habitat and prevent new trails from being constructed within 0.25 miles from known occurrences of the orchid.

Best Management Practices

1. When project proposals are received, BLM will initiate coordination with the USFWS at the earliest possible date so that both agencies can advise on project design. This should minimize the need to redesign projects at a later date to include orchid conservation measures, determined as appropriate by the USFWS.

2. The BLM will participate in the development of both, a conservation agreement/assessment strategy and a species specific recovery plan for the orchid in coordination with the USFWS and other agencies as appropriate. Orchid habitat on BLM-administered lands will be monitored to determine if recovery/conservation objectives are being met.

3. The BLM will coordinate with the USFWS, the NRCS, and private landowners to ensure adequate protection for the orchid and its habitat when new activities are proposed, and to work proactively to enhance the survival of the plant.

4. In the event that a new population of the orchid is found, the USFWS Wyoming Field Office (307-772-2374) will be notified within 48 hours of discovery.

5. Livestock grazing, mowing/haying, and some burning are specific management tools that the BLM may use to maintain favorable habitat conditions for the orchid where feasible. Mowing and grazing, with proper timing and intensity, reduce the native and exotic plant competition for light and possibly for water, space and nutrients.

6. Recreational foot trails that may be located adjacent to Ute ladies' tresses plant habitat should be constructed to reduce impacts to this species.

7. To prevent loss of habitat for the orchid, the BLM "shall retain in Federal ownership all habitats essential for the survival and recovery of any listed species, including habitat that was used historically, that has retained its potential to sustain listed species, and is deemed to be essential to their survival" (BLM 2001). Prior to any land tenure adjustments in *potential* orchid habitat, the BLM will survey to assess the potential for the existence of the orchid. While it is difficult to assess whether the orchid was historically present on such sites, the BLM should try and retain in federal ownership all habitats essential for the survival and recovery of the orchid, including habitat that was used historically, that has retained its potential to sustain this listed species, and is deemed to be essential to their survival (BLM 2001). Potential orchid habitat may be used for reintroduction efforts and is important for the recovery and enhancement of the species.

8. Prescribed fire and grazing activities shall be coordinated between biologists, rangeland management specialists, and fire personnel to ensure that no damage occurs to the plant habitat when being used to maintain the habitat for the species.

9. Maintain and restore the dynamics of stream systems, including the movement of streams within their floodplains, which are vital for the life cycle of the orchid. Flow timing, flow quantity, and water table characteristics should be evaluated to ensure that the riparian system is maintained where these plants occur. The Bureau should continue water use in a manner that maintains suitable habitat for the Ute ladies' tresses orchid to benefit the species.

10. Maintain and restore the natural species composition and structural diversity of plant communities in riparian zones and wetlands.

11. For the protection of the orchid and its potential habitat, surface-disturbing activities listed above, should be avoided in the following areas when they occur outside of the protective 0.25 buffer from populations of the orchid: (a) identified 100-year flood plains; (b) areas within 500 feet from perennial waters, springs, wells, and wetlands, and; (c) areas within 100 feet from the inner gorge of ephemeral channels.

12. Form a steering committee to develop and prioritize management practices and assist BLM and USFWS with research projects.

13. Conduct inventories for the orchid in areas with potential habitat.

14. Maintain a database of all searched, inventoried, or monitored orchid sites.

15. Analyze vegetation treatments (mowing, prescribed fire, mechanical treatments, etc.) in known or potential habitat for the orchid to determine impacts to the species.

16. Establish monitoring, biological, ecological, population demographics, and life history studies as funding and staffing allow, such as, monitoring current populations each year for trends, studies regarding identification of pollinators, genetics, life history, effects of pesticides and herbicides, seed viability and germination, and studies regarding monitoring the success of reintroduction efforts. Monitor orchid population sites for invasion by noxious and invasive plant species.

17. Perform monitoring and analysis pertaining to flow timing, flow quantity, and water table characteristics with the goal of ensuring that riparian vegetation, in areas of known and potential habitat for the orchid, is maintained.

18. When possible, collect and bank orchid seeds at local, regional, national, and international arboreta, seed banks, and botanical gardens as insurance against catastrophic events, for use in biological studies, and for possible introduction/reintroduction into potential habitat.

19. Train law enforcement personnel on protections for the orchid and its habitat, its status, and current threats to its existence.

20. Educate resource specialists, rangers, and fire crews about the orchid and its habitat to help with project design for the general area and for fire suppression actions occurring in potential habitat for the orchid and on the habitat characteristics and plant identification for the plant, so that if they encounter the orchid occurring in riparian habitat, they can report it to their office threatened and endangered species specialist.

21. The BLM should work towards developing reintroduction sites in coordination with the USFWS and to maintain the integrity of these sites for the survival of the orchid. The objective would be to reintroduce populations of the orchid into areas of historic occurrence and introduce new populations in suitable habitat within the plant's historic range.

22. Develop propagation techniques and use them to reintroduce/introduce the orchid and to repopulate known populations in the event population recovery becomes necessary.

USFWS Programmatic Biological Opinion (USFWS 2007)

1. In known occupied Ute ladies'-tresses habitat, the Service recommends that the Bureau use management actions that are compatible with protection and conservation of pollinators of the Ute ladies'-tresses orchid.

2. The Service recommends that the Bureau monitor and manage invasive species so these do not impact the Ute ladies'-tresses orchid or its habitat.

3. The Service recommends that the Bureau not authorize herbicide use in known or occupied Ute ladies'-tresses habitat without prior review by Service biologists.

BLM National Greater Sage-Grouse Land Use Planning Strategy (BLM IM 2012-044) (BLM 2012b)

Lands and Realty

- Where existing leases or ROWs have had some level of development (road, fence, well, etc.) and are no longer in use, reclaim the site by removing these features and restoring the habitat. Within designated priority habitat, reclaim by removing these features and restoring the habitat of these ROW that are no longer in use.

Vegetation Management

- Design post restoration management to ensure long term persistence. This could include changes to livestock grazing management and travel management, etc., to achieve and maintain the desired condition of the restoration effort that benefits sage-grouse (Eiswerth and Shonkwiler 2006).

- Consider potential changes in climate (Miller et al. 2011) when proposing restoration seedings using native plants. Consider collection from warmer component of the species current range when selecting native species (Kramer and Havens 2009).

Livestock Grazing Management

- Work cooperatively with permittees, lessees and other landowners to develop grazing management strategies that integrate both public and private lands into single management units.
- Implement management actions (grazing decisions, AMP/Conservation Plan development, or other agreements) to modify grazing management to meet seasonal sage-grouse habitat requirements (Connelly et al. 2011). Consider singly, or in combination, changes in:
  1. Season or timing of use;
  2. Number of livestock (includes temporary non-use or livestock removal);
  3. Distribution of livestock use;
  4. Intensity of use; and
  5. Type of livestock (e.g., cattle, sheep, horses, llamas, yaks, alpacas and goats) (Briske et al. 2011).
- During drought periods, prioritize evaluating effects of the drought in priority sage-grouse habitat areas relative to their needs for food and cover. Since there is a lag in vegetation recovery following drought (Thurow and Taylor 1999; Cagney et al. 2010), ensure that post-drought management allows for vegetation recovery that meets sage-grouse needs in priority sage-grouse habitats.
- Reduce hot season grazing on riparian and meadow complexes to promote recovery or maintenance of appropriate vegetation and water quality. Utilize fencing/herding techniques or seasonal use or livestock distribution changes to reduce pressure on riparian or wet meadow vegetation used by sage-grouse in the hot season (summer) (Aldridge and Brigham 2002; Crawford et al. 2004; Hagen et al. 2007).
- Avoid grazing and trailing within lekking, nesting, brood-rearing, and winter habitats during periods of the year when these habitats are utilized by sage-grouse.
- Authorize new water development for diversion from spring or seep source only when sage-grouse habitat would benefit from the development. This includes developing new water sources for livestock as part of an AMP/conservation plan to improve sage-grouse habitat.
- Design any new structural range improvements to conserve, enhance, or restore sage-grouse habitat through an improved grazing management system relative to sage-grouse objectives. Structural range improvements, in this context, include but are not limited to: cattleguards, fences, enclosures, corrals or other livestock handling structures; pipelines, troughs, storage tanks (including moveable tanks used in livestock water hauling), windmills, ponds/reservoirs, solar panels and spring developments.
- Design all range projects in a manner that minimizes potential for invasive species establishment. Monitor for, and treat invasive species associated with existing range developments (Gelbard and Belnap 2003; Bergquist et al. 2007).
- Any vegetation treatment plan must include pretreatment data on wildlife and habitat condition, establish non-grazing exclosures, and include long-term monitoring where treated areas are

monitored for at least three years before grazing returns. Continue monitoring for five years after livestock are returned to the area, and compare to treated, ungrazed exclosures, as well as untreated areas.

BLM National Sage-Grouse Habitat Conservation Strategy's Suggested Management Practices (BLM 2004)

- Reduce habitat loss associated with mineral exploration and development by consolidating facilities as much as possible. The possibility of burying utility and flow lines beneath or along roads, centralizing tank batteries, and drilling multiple wells from a single location should be considered.

- Design and construct mineral exploration and development operations so as to disturb the smallest footprint practical on the landscape while meeting all safety requirements. Where feasible, consider mowing of parking and storage areas on portions of oil and gas well drilling locations rather than stripping the topsoil and vegetation from the entire location, and the use of two-track trails to conduct exploration activities. Minimize traffic by limiting public vehicular access in new development areas, use remote monitoring of production facilities, encourage car-pooling and the use of buses, and encourage operator-enforced speed limits to reduce dust, noise, and potential collisions with Greater Sage-Grouse so as to reduce habitat impacts. Consider using stakeless geophysical exploration activities to reduce vehicle traffic in sagebrush habitat.

- Plan and construct mining and mineral development activities, to the degree possible given State water rights, to minimize disturbances that would result in alterations to springs and riparian habitat. Greater Sage-Grouse can be impacted by the loss of surface water. Alternative water sources should be developed to replace natural sources that have been negatively affected or destroyed during these development activities. Water storage impoundments should be designed to avoid or minimize loss or degradation of Greater Sage-Grouse habitat. Water storage impoundments should be monitored and treated to prevent mosquito breeding (and the associated spread of West Nile Virus). Evaporation, reserve, work over, and production pits should also be designed with adequate fencing/netting or other protective features to reduce mortality of Greater Sage-Grouse due to drowning or entrapment.

- Steps such as recontouring, respreading topsoil, revegetating all disturbed areas not needed for well or mine production, including cuts, fills, borrow ditches, and well pads up to the production facilities are suggested. Additionally, allowing room for the setup of work over rigs, and allowing future setup and parking on the top of new vegetation will minimize the need for future disturbances. The use of native species of shrubs, forbs, and grasses in seed mixes appropriate for each ecological site will also enhance habitat value or Greater Sage-Grouse.

- Evaluate (e.g., monitor) burned areas for up to three years post-fire and continue management restrictions until the recovering or seeded plant community reflects the desired condition.

- Reclaim unnecessary or redundant roads and facilities by removing surfacing material, reestablishing the original contour, spreading topsoil, and seeding to restore habitat.

- Encourage vegetative restoration along roads, ROWs, on well pads, and at existing facilities where habitat needs for Greater Sage-Grouse are not currently met.

- Place new roads where construction activity and use is concentrated and does not impact critical areas such as leks, nesting, early brood-rearing, winter habitat, riparian areas, springs and wetlands.

- Require successful seeding of appropriate vegetation on any new disturbance associated with mineral and energy facility developments, livestock management facilities, and recreation facilities.

- Restore small areas dominated by invasive species with desirable vegetation to minimize fragmentation of habitat.

- Where good habitat quality exists, maintain current management practices considering plant composition and soil type.

- Change mineral supplement and/or watering locations to move domestic livestock to desired areas. However, any change in location of supplement or watering location should consider potential effects to Greater Sage-Grouse habitat.

- Maintain seeps, springs, wet meadows, and riparian vegetation in a functional and diverse condition for young Greater Sage-Grouse and other species that depend on forbs and insects associated with these areas. Consider fencing if vegetation associated with these wet areas cannot be maintained with current livestock or wildlife use and the impacts of the fence are outweighed by the improved habitat quality.

- Grazing use should be adjusted during extended drought periods. Consider transitioning back to pre-drought use when drought conditions have ended.

- Where other grazing management options are not achieving, or cannot achieve, the desired objectives, a short-term option may be livestock exclusion.

- Restore lost riparian and wetland plant species diversity and structure by replanting appropriate species near crucial Greater Sage-Grouse habitat.

- Treatments should be designed to improve a deficient condition within the community (e.g., poor cover of herbaceous understory).

Northeast Wyoming Sage-Grouse Conservation Plan (NWSGLWG 2006)

- Roads

    - Place roads outside of riparian areas where possible.

    - If avoidance is not possible, minimize impacts to riparian, wetland, or wet meadow habitats to limit impacts to brood rearing areas. (exploration, drilling, production and operations).

    - Select sites for construction that will not disturb suitable nest cover or brood-rearing habitats within 3 miles (5 kilometers) of occupied leks, or within identified nesting and brood-rearing habitats outside the 3-mile (5 kilometer) perimeter (Connelly et al. 2000).

- Powerlines

- Select sites for construction that will not disturb suitable nest cover and brood-rearing habitats within 3 miles (Connelly et al. 2000) of a lek.
- Locate any above-ground powerlines off of ridges and out of riparian areas (1,000 feet (300 meter) riparian buffer where feasible).

- General Mineral Development
  - Avoid surface and sub-surface water depletion that impacts sage-grouse habitats.

- Livestock Grazing Management
  - In general, avoid yearlong and spring-to-fall continuous grazing schemes in sage-grouse habitat. Yearlong and spring-to-fall grazing may be a tool if it is not continued each year.
  - Where appropriate, implement livestock grazing systems that provide for areas and times of rest or deferment.
  - Where practicable, avoid heavy utilization of grazed pastures to compensate for rested pastures (a year of rest cannot compensate for a year of excessive use).
  - Design grazing systems that provide sage-grouse habitat in riparian areas and around water sources.
  - Manage stocking rates and rotations to maintain the health and productivity of rangelands for livestock and sage-grouse. Incorporate one of the monitoring programs from the Wyoming Rangeland Monitoring Guide to ensure proper grazing utilization and plant recovery.
  - In pastures with riparian habitats (assuming riparian vegetation is actively growing), manage livestock grazing to allow herbaceous vegetation recovery.
  - New spring developments in sage-grouse habitat should be designed to maintain or enhance the free-flowing characteristics of springs and wet meadows with the use of float valves on troughs or other features where feasible. Spring and wet meadows should be protected from over utilization and trampling by livestock.

Northern Long-Eared Bat Interim Conference and Planning Guidance (USFWS 2014)
Measures that BLM is willing to fully commit to have been re-worded to reflect the BLM's commitment; and the measures have been re-ordered placing the committed conservation measures above the recommended best management practices.

Hibernacula, Spring Staging and Fall Swarming Habitat (Oct 1 - May 14):

Conservation Measures

- BLM will take actions to protect Northern Long-Eared Bat hibernacula. Where a known Northern Long-Eared Bat hibernaculum is experiencing threats, BLM work with the USFWS and other partners to provide the necessary protections (e.g., limit human disturbance, install bat-friendly gates, ensure the use of "clean" clothing and gear).
- BLM will participate in actions to manage and reduce the impacts of WNS on Northern Long-Eared Bats. A national plan was prepared by the USFWS and other state and federal agencies that details actions needed to investigate and manage WNS.

- BLM will avoid disturbing/injuring hibernating bats by:
  - Not entering Northern Long-Eared Bat hibernacula during the hibernation season, unless coordinated with the Service for survey, research, or other management purposes.
  - Complying with all cave and mine closures, advisories, and regulations.
  - Avoiding planned fire or other sources of smoke within 0.25 mile of known Northern Long-Eared Bat during hibernation season, or coordinate with the USFWS.
- BLM will avoid destruction/alteration (e.g., fill, cause collapse of) of caves/mines that may support hibernating bats by:
  - Prohibiting woody vegetation or spoil (e.g., soil, rock, etc.) disposal within 100 feet of known hibernacula entrances and associated sinkholes, fissures, or other karst features.
  - When blasting within 0.5 miles of known or presumed known or presumed occupied hibernacula entrances and passages, BLM will coordinate with the USFWS to ensure that the blasting will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of the hibernacula.
  - When drilling or hydraulic fracturing within 0.5 miles of a known or presumed occupied hibernacula entrances and passages, BLM will coordinate with the USFWS to ensure that the drilling will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of the hibernacula.
  - Avoiding modifying cave or mine entrances that support hibernating bats. If there are safety concerns or concerns about bats (e.g., disturbance, vandalism) at a site, only "bat friendly" cave/mine gates will be installed.
- BLM will avoid/minimize alterations of clean drinking water and foraging areas by:
  - Protecting potential recharge areas of cave streams and other karst features that are hydrologically connected to known or assumed hibernacula.
  - Setting back equipment servicing and maintenance areas at least 300 feet away from streambeds, sinkholes, fissures, or areas draining into sinkholes, fissures, or other karst or mine features.
  - Following available standards on spill prevention, containment, and control.
  - Restricting use of herbicides for vegetation management near known or assumed Northern Long-Eared Bat hibernacula to those specifically approved for use in karst (e.g., sinkholes) and water (e.g., streams, ponds, lakes, wetlands).
  - Implement strict adherence to sediment and erosion control measures and reclamation standards.
- BLM will avoid disturbing/killing/injuring Northern Long-Eared Bats during spring staging/fall swarming by:

- not clearing occupied spring staging and fall swarming habitat near known Northern Long-Eared Bat hibernacula during the staging and swarming seasons. Surveys will be conducted to determine occupancy prior to any tree clearing activities.
- avoiding planned fire or other sources of smoke in known Northern Long-Eared Bat habitat during the swarming/staging or hibernation season, or coordinate with the USFWS.

- BLM will minimize the spread of WNS. If a cave or mine that could harbor hibernating bats must be entered, and it does not have a cave and mine closure policy, BLM follow approved WNS decontamination protocols. Under no circumstances will clothing, footwear, or equipment that was used in a WNS-affected state or region be used.

Best Management Practices

- Avoid disturbing/killing/injuring Northern Long-Eared Bats during spring staging/fall swarming by:
  - Avoid clearing suitable spring staging and fall swarming habitat within 5.0 miles of known Northern Long-Eared Bat hibernacula during the staging and swarming seasons.
  - Activities involving continuing (i.e., longer than 24 hours) noise disturbances greater than 75 decibels measured on the A scale (e.g., loud machinery) within a five-mile radius of known hibernacula would be avoided during the spring staging and fall swarming seasons.
  - During spring staging and fall swarming, use tanks to store waste fluids to ensure no loss of bats by entrapment in waste pits within 5 miles of known or presumed hibernacula.
  - Operate wind turbines during periods (e.g., months, hours, wind speeds) when Northern Long-Eared Bat activity is unlikely.
- Maintain spring staging/fall swarming forested habitat within 5.0 miles of known Northern Long-Eared Bat hibernacula.
  - Retain snags, dead/dying trees, and trees with exfoliating (loose) bark ≥3-inch diameter at breast height in areas ≤ one mile from water.
  - Minimize impacts to all forest patches.
  - Maintain forest patches and forested connections (e.g., hedgerows, riparian corridors) between patches.
  - Maintain natural vegetation between forest patches/connections and developed areas.

Summer Habitat (May 15 - Sep 30):

Conservation Measures

- BLM will determine where Northern Long-Eared Bats occur in the summer.
  - Coordinate with partners to gather and evaluate Northern Long-Eared Bat location information.
  - Review both positive and negative data (e.g., acoustic transect surveys).

- BLM will take actions to protect Northern Long-Eared Bats and their habitat within known Northern Long-Eared Bat home ranges.
- BLM will avoid killing or injuring Northern Long-Eared Bats during tree clearing activities by not clearing occupied maternity colony summer habitat during the summer maternity season. Surveys will be conducted to determine occupancy prior to any tree clearing activities.
- BLM will minimize other direct effects to Northern Long-Eared Bats by not clearing occupied summer habitat during the time of year when females are pregnant or the pups are incapable of flight. Surveys will be conducted to determine occupancy prior to any tree clearing activities.
- BLM will not conduct planned fire within occupied summer habitat during the time of year when females are pregnant or the pups are incapable of flight. Surveys will be conducted to determine occupancy prior to any tree clearing activities. (fire only)
- BLM will avoid/minimize altering clean drinking water and foraging areas by:
    - Implementing sediment and erosion control measures and reclamation standards.
    - Siting equipment servicing and maintenance areas at least 300 feet away from waterbodies (e.g., wetlands, streams). Following available standards on spill prevention, containment, and control.
- BLM will maintain summer maternity habitat by:
    - Retaining known roost trees, which includes live or dead trees and snags ≥3 inches diameter at breast height that have exfoliating bark, cracks, crevices, or cavities. Surveys will be conducted to determine occupancy prior to any tree clearing activities.
    - Clearly demarcating trees to be protected vs. cut to help ensure that contractors do not accidentally remove more trees than anticipated.

Best Management Practices

- Determine where Northern Long-Eared Bats occur in the summer by performing baseline bat surveys.
- BLM will minimize direct effects by:
    - During prescribed burns, where the proposed perimeter fire line is constructed by hand, construct it at least two tree-lengths away from any known habitat, or potential roost trees that have been identified. If such trees are adjacent to a fixed part of the fire line such as the road, a trail, or the river, they will have fire line constructed around the bases, so long as their remaining in place does not jeopardize firefighter safety.
    - Whenever possible, conduct prescribed burns outside of the summer maternity season. Burns conducted during the summer maternity season should be low/moderate intensity to minimize direct impacts to Northern Long-Eared Bats.
    - Fire-effects monitoring should be used before, during, and after the burns to ensure that burning conditions and effects are within the desired ranges.
    - Use tanks to store waste fluids to ensure no loss of bats by entrapment in waste pits.

- Avoid conducting construction activities after sunset in known or suitable summer habitat to avoid harassment of foraging Northern Long-Eared Bats.
- Operate wind turbines during periods (e.g., months, hours, wind speeds) when Northern Long-Eared Bat activity is unlikely.

- BLM will avoid/minimize altering clean drinking water and foraging areas by:
  - Minimizing use of herbicides and pesticides. If necessary, spot treatment is preferred over aerial application.
  - Minimizing use of chemicals in/around storm water detention basins.
  - Minimizing potential lighting impacts (e.g., reduce the number of lights, use motion sensors, use shields/full cut-off lens, angle lights downward and away from forest).
  - Contaminants, including but not limited to oils and solvents, would be controlled so the quality, quantity, and timing of prey resources are not affected.
  - Avoiding filling, channelizing, or degrading streams, wetlands, and other watering areas where possible.
- BLM will maintain summer maternity habitat by:
  - Retaining and avoiding potential roost trees, which includes live or dead trees and snags ≥3 inches diameter at breast height that have exfoliating bark, cracks, crevices, or cavities. Not removing trees surrounding potential roosts to maintain the microclimate.
  - Where possible and not a safety hazard, leaving dead or dying trees standing.
  - Avoiding reducing the suitability of forest patches with known Northern Long-Eared Bat use.
  - Maintaining or improving forest patches.
  - Avoiding/minimizing tree clearing that fragments large forested areas or tree lined corridors. For example, routing linear features along the edge of a woodlot instead of through the middle of it; using horizontal directional drilling for pipeline crossings of wooded stream corridors and upland tree lines.

A Conservation Plan for Bats in Wyoming (Hester and Grenier 2005)
Measures that BLM is willing to fully commit to have been re-worded to reflect the BLM's commitment; and the measures have been re-ordered placing the committed conservation measures above the recommended best management practices.

Conservation Measures

- BLM, in cooperation with the State of Wyoming and/or the Service, will implement inventory and monitoring to determine population status and habitat requirements, as additional information is necessary to guide management actions.
- BLM will manage BLM administered lands where *Myotis septentrionalis* occurs in such a way that provides adequate roosting and foraging habitat to maintain stable populations (that is, secure roosting sites; diverse, native foraging habitat; and uncontaminated water sources).

- BLM will not harvest timber in areas close to occupied roosting sites during the maternity roosting period (Schmidt 2003). Surveys will be conducted to determine occupancy prior to any tree harvest activities. Patch cuts and selective harvesting will be utilized to provide regenerating forest and retain large-diameter snags (Lacki and Schwierjohann 2001).

- BLM will evaluate and where appropriate require BMPs for natural caves and abandoned mines in areas where *Myotis septentrionalis* roosts.

Best Management Practices

- Retain all large-diameter snags, particularly those greater than 21 cm (8 in) diameter at breast height (Schmidt 2003), as potential roost sites for *Myotis septentrionalis* and other snag-dependent species. Provide large-diameter snags in early states of decay, particularly snags with large amounts of exfoliating bark (Lacki and Schwierjohann 2001). Retain mature and decadent trees for future snag production, particularly where existing snags are few. Because the northern myotis switches tree roosts frequently and may need several suitable roosts over the course of a summer (Foster and Kurta 1999; Caceres and Barclay 2000), retain all snags in areas where bats are known to roost.

- Implement BMPs for natural caves and abandoned mines in areas where *Myotis septentrionalis* roosts.

- Avoid or minimize pesticide use in areas where the *Myotis septentrionalis* is known to occur to avoid direct poisoning and to maintain a food source for this species and other insectivores. Where possible, allow insect outbreaks to proceed naturally.

Bureau of Land Management White-nose Syndrome Interim Response Strategy (Washington Office Instruction Memorandum No. 2010-181 [BLM 2010d])

- BLM will coordinate and conduct outreach with appropriate internal and external stakeholders to prevent or contain the spread of WNS.

- BLM will identify caves and abandoned mine features with important bat resources (refer to all three attachments for more detail).

- BLM will follow the Containment and Decontamination Procedures for Bureau of Land Management Administered Lands to Minimize the Spread of White-Nose Syndrome in Caves and Abandoned Mines August 5, 2010 outlined in WO IM No. 2010-181.

- BLM will participate in interagency groups to develop state WNS response plans.

- BLM will recommend locations to test for the presence of WNS at a subset of the sites that have been identified as having important bat resources and support WNS research efforts where practicable and feasible within budgetary constraints.

A Strategic Plan for White-nose Syndrome in Wyoming (Abel and Grenier 2011)

- BLM will coordinate with the State of Wyoming and the Service to implement Wyoming's strategic plan for WNS prevention, and continue to work with the WGFD and other stakeholders in minimizing the risk of WNS spread into Wyoming.

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Appendix J. Mitigation Guidelines for Surface-Disturbing and Disruptive Activities, Wyoming Bureau of Land Management

J.1. Introduction

Wyoming Mitigation Guidelines are a compilation of practices employed by Bureau of Land Management (BLM) to mitigate impacts from surface disturbance. They apply to activities such as road or pipeline construction, range improvements, and permitted recreation activities. The guidelines are designed to protect resources such as soils and vegetation, wildlife habitat, and cultural or historic properties. The guidelines are presented as an appendix of the Resource Management Plan (RMP) and Environmental Impact Statement (EIS) for easy reference as they apply to many resources and derive from many laws. All BLM RMPs have included these guidelines as appendices. Public comment on the guidelines, per se, has not been requested. The guidelines are not land use decisions; rather they are examples of mitigation measures that could be applied, as appropriate, based on site-specific National Environmental Policy Act (NEPA) analysis for individual proposals. Comment on the use and application of specific mitigation measures can be made during the NEPA process for individual proposals. Because mitigation measures change or are modified, based on new information, the guidelines are updated periodically for all field offices in Wyoming.

These guidelines are primarily for the purpose of attaining statewide consistency in how requirements are determined for avoiding and mitigating environmental impacts and resource and land use conflicts. Consistency in this sense does not mean that identical requirements would be applied for all similar types of land use activities that may cause similar types of impacts. Nor does it mean that the requirements or guidelines for a single land use activity would be identical in all areas.

There are two ways the mitigation guidelines are used in the RMP and EIS process: (1) as part of the planning criteria in developing the RMP alternatives; and (2) in the analytical processes of both developing the alternatives and analyzing the impacts of the alternatives. In the first case, an assumption is made that any one or more of the mitigations will be appropriately included as conditions of relevant actions being proposed or considered in each alternative. In the second case, the mitigations are used (1) to develop a baseline for measuring and comparing impacts among the alternatives; (2) to identify other actions and alternatives that should be considered; and (3) to help determine whether more stringent or less stringent mitigations should be considered.

The EIS for the RMP does not decide or dictate the exact wording or inclusion of these guidelines. Rather, the guidelines are used in the RMP and EIS process as a tool to help develop the RMP alternatives and to provide a baseline for comparative impact analysis in arriving at RMP decisions. These guidelines will be used in the same manner in analyzing activity plans and other site-specific proposals. These guidelines and their wording are matters of policy. As such, specific wording is subject to change primarily through administrative review, not through the RMP and EIS process. Any further changes that may be made in the continuing refinement of

these guidelines and any development of program-specific standard stipulations will be handled in another forum, including appropriate public involvement and input.

J.1.1. Purpose

The purposes of the "Wyoming BLM Mitigation Guidelines" are (1) to reserve, for the BLM, the right to modify the operations of all surface and other human presence disturbance activities as part of the statutory requirements for environmental protection; and (2) to inform a potential lessee, permittee, or operator of the requirements that must be met when using BLM-administered public lands. These guidelines have been written in a format that will allow for (1) their direct use as stipulations, and (2) the addition of specific or specialized mitigation following the submission of a detailed plan of development or other project proposal, and an environmental analysis.

Those resource activities or programs currently without a standardized set of permit or operation stipulations can use the mitigation guidelines as stipulations or as conditions of approval, or as a baseline for developing specific stipulations for a given activity or program.

Because use of the mitigation guidelines was integrated into the RMP EIS process and will be integrated into the site-specific environmental analysis process, the application of stipulations or mitigation requirements derived through the guidelines will provide more consistency with planning decisions and plan implementation than has occurred in the past. Application of the mitigation guidelines to all surface and other human presence disturbance activities concerning BLM-administered public lands and resources will provide more uniformity in mitigation than has occurred in the past.

J.2. Mitigation Guidelines

J.2.1. Surface Disturbance Mitigation Guideline

Surface disturbance will be prohibited in any of the following areas or conditions. Exception, waiver, or modification of this limitation may be approved in writing, including documented supporting analysis, by the authorized officer.

- Slopes in excess of 25 percent.
- Within important scenic areas (Class I and II Visual Resource Management Areas).
- Within 500 feet of surface water and/or riparian areas.
- Within either 0.25 mile or the visual horizon (whichever is closer) of historic trails.
- Construction with frozen material or during periods when the soil material is saturated or when watershed damage is likely to occur.

Guidance

The intent of the Surface Disturbance Mitigation Guideline is to inform interested parties (potential lessees, permittees, or operators) that when one or more of the five conditions exist, surface-disturbing activities will be prohibited unless or until a permittee or his designated representative and the surface management agency arrive at an acceptable plan for mitigation of anticipated impacts. This negotiation will occur prior to development.

Specific criteria (e.g., 500 feet from water) have been established based upon the best information available. However, such items as geographical areas and seasons must be delineated at the field level. Exception, waiver, or modification of requirements developed from this guideline must be based upon environmental analysis of proposals (e.g., activity plans, plans of development, plans of operation, and applications for permit to drill) and, if necessary, must allow for other mitigation to be applied on a site-specific basis.

J.2.2. Wildlife Mitigation Guideline

When a proposed discretionary land use has potential for affecting wildlife or their habitat, mitigation will be considered. BLM will consult with the U.S. Fish and Wildlife Service (USFWS) on any proposals that may affect Endangered Species Act (ESA) listed, proposed, or candidate species.

Guidance

The Wildlife Mitigation Guideline is intended to provide two basic types of protection: seasonal restriction and prohibition of activities or surface use. Legal descriptions will ultimately be required when applying mitigation and should be measurable and legally definable. There are no minimum subdivision requirements at this time. The area delineated can and should be defined as necessary, based upon current biological data, prior to the time of processing an application and issuing the use authorization. The legal description must eventually become a part of the condition for approval of the permit, plan of development, and/or other use authorization.

Seasonal restrictions protect wildlife during sensitive times of the year such as during the winter when many species are stressed and the spring when most species are bearing and rearing young.

The prohibition of activity or surface use, is intended for protection of specific wildlife habitat areas or values within the use area that cannot be protected by using seasonal restrictions. These areas or values must be factors that limit life-cycle activities (e.g., Greater Sage-Grouse strutting grounds, known Threatened and Endangered species habitat). Frequently, prohibition areas are found within seasonal restriction areas.

Exception, waiver, or modification of requirements developed from this guideline must be based upon environmental analysis of proposals (e.g., activity plans, plans of development, plans of operation, applications for permit to drill) and, if necessary, must allow for other mitigation to be applied on a site-specific basis.

J.2.3. Cultural Resource Mitigation Guideline

When a proposed discretionary land use has potential for affecting the characteristics which qualify a cultural property for the National Register of Historic Places (NRHP), mitigation will be considered. In accordance with Section 106 of the Historic Preservation Act, procedures specified in 36 Code of Federal Regulation (CFR) 800 will be used in consultation with the Wyoming State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation in arriving at determinations regarding the need and type of mitigation to be required.

Guidance

The preferred strategy for treating potential adverse effects on cultural properties is "avoidance." If avoidance involves project relocation, the new project area may also require cultural resource inventory. If avoidance is imprudent or unfeasible, appropriate mitigation may include excavation (data recovery), stabilization, monitoring, protection barriers and signs, or other physical and administrative measures.

Reports documenting results of cultural resource inventory, evaluation, and the establishment of mitigation alternatives (if necessary) shall be written according to standards contained in BLM Manuals, the cultural resource permit stipulations, and in other policy issued by the BLM. These reports must provide sufficient information for Section 106 consultation. Reports shall be reviewed for adequacy by the appropriate BLM cultural resource specialist. If cultural properties on, or eligible for, the NRHP are located within these areas of potential impact and cannot be avoided, the authorized officer shall consult with the SHPO in accordance with National Historic Preservation Act Section 106 and the procedures contained in 36 CFR 800.

Mitigation measures shall be implemented according to the mitigation plan approved by the BLM authorized officer. Such plans are usually prepared by the land use applicant according to BLM specifications. Mitigation plans will be reviewed as part of Section 106 consultation for NRHP eligible or listed properties. The extent and nature of recommended mitigation shall be commensurate with the significance of the cultural resource involved and the anticipated extent of damage. Reasonable costs for mitigation will be borne by the land use applicant. Mitigation must be cost effective and realistic. It must consider project requirements and limitations, input from concerned parties, and be BLM approved or BLM formulated.

Mitigation of paleontological and natural history sites will be treated on a project specific basis. Factors such as site significance, economics, safety, and project urgency must be taken into account when making a decision to mitigate. Authority to protect (through mitigation) such values is provided for in the Federal Land Policy and Management Act (FLPMA), Section 102(a)(8). When avoidance is not possible, appropriate mitigation may include excavation (data recovery), stabilization, monitoring, protection barriers and signs, or other physical and administrative protection measures.

J.2.4. Special Resource Mitigation Guideline

To protect (resource value), activities or surface use will not be allowed (i.e., within a specific distance of the resource value or between date to date) in (legal description).

Application of this limitation to operation and maintenance of a developed project must be based on environmental analysis of the operational or production aspects.

Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the authorized officer.

Example Resource Categories (select or identify category and specific resource value):

- Recreation areas
- Special natural history or paleontological features
- Special management areas
- Sections of major rivers
- Prior existing rights-of-way
- Occupied dwellings

- Other (specify)

Guidance

The Special Resource Mitigation Guideline is intended for use only in site-specific situations where one of the first three general mitigation guidelines will not adequately address the concern. The resource value, location, and specific restrictions must be clearly identified. A detailed plan addressing specific mitigation and special restrictions will be required prior to disturbance or development and will become a condition for approval of the permit, plan of development, or other use authorization.

Exception, waiver, or modification of requirements developed from this guideline must be based upon environmental analysis of proposals (e.g., activity plans, plans of development, plans of operation, applications for permit to drill) and, if necessary, must allow for other mitigation to be applied on a site-specific basis.

J.2.5. No Surface Occupancy Guideline

No Surface Occupancy (NSO) will be allowed on the following described lands (legal description) because of (resource value).

Example Resource Categories (select or identify category and specific resource value):

- Recreation areas (e.g., campgrounds, historic trails, national monuments)
- Major reservoirs/dams
- Special management area (e.g., known Threatened or Endangered species habitat, areas suitable for consideration for wild and scenic rivers designation)
- Other (specify)

Guidance

The NSO Mitigation Guideline is intended for use only when other mitigation is determined insufficient to adequately protect the public interest and is the only alternative to "no development" or "no leasing." The legal description and resource value of concern must be identified and be tied to an NSO land use planning decision.

Waiver of, or exception(s) to, the NSO requirement will be subject to the same test used to initially justify its imposition. If, upon evaluation of a site-specific proposal, it is found that less restrictive mitigation would adequately protect the public interest or value of concern, then a waiver or exception to the NSO requirement is possible. The record must show that because conditions or uses have changed, less restrictive requirements will protect the public interest. An environmental analysis must be conducted and documented (e.g., environmental assessment, EIS, etc., as necessary) in order to provide the basis for a waiver or exception to an NSO planning decision. Modification of the NSO requirement will pertain only to refinement or correction of the location(s) to which it applied. If the waiver, exception, or modification is found to be consistent with the intent of the planning decision, it may be granted. If found inconsistent with the intent of the planning decision, a plan amendment would be required before the waiver, exception, or modification could be granted.

When considering the "no development" or "no leasing" option, a rigorous test must be met and fully documented in the record. This test must be based upon stringent standards described in the land use planning document. Since rejection of all development rights is more severe than the most restrictive mitigation requirement, the record must show that consideration was given to development subject to reasonable mitigation, including "no surface occupancy." The record must also show that other mitigation was determined to be insufficient to adequately protect the public interest. A "no development" or "no leasing" decision should not be made solely because it appears that conventional methods of development would be unfeasible, especially where an NSO restriction may be acceptable to a potential permittee. In such cases, the potential permittee should have the opportunity to decide whether or not to go ahead with the proposal (or accept the use authorization), recognizing that an NSO restriction is involved.

Appendix K. Biological Resources Support Documents

K.1. Biological Resources of the Buffalo Planning Area

Table K.1. Common and Scientific Names of Plant and Wildlife Species Identified in the Buffalo Resource Management Plan and Environmental Impact Statement

Common Name	Scientific Name
Plants*	
Alder	*Alnus spp. Mill.*
Alfalfa	*Medicago sativa L.*
Alkali sacaton	*Sporobolus airoides (Torr.) Torr.*
Alpine poppy	*Papaver pygmaeum Rydb.*
American plum	*Prunus americana Marshall*
Antelope bitterbrush	*Purshia tridentata (Pursh) DC.*
Barley	*Hordeum spp. L.*
Basin big sagebrush	*Artemisia tridentata Nutt. ssp. tridentata*
Basin wildrye	*Leymus cinereus (Scribn. & Merr.) Á. Löve*
Beardtongue	*Penstemon spp. Schmidel*
Birch	*Betula spp. L.*
Bitterbrush	*Purshia DC. ex Poir.*
Black henbane	*Hyoscyamus niger L*
Black sagebrush	*Artemisia nova A. Nelson*
Blowout penstemon (beardtongue)	*Penstemon haydenii S. Watson*
Blue elderberry	*Sambucus nigra L. ssp. cerulea (Raf.) R. Bolli*
Blue grama	*Bouteloua gracilis (Willd. ex Kunth) Lag. ex Griffiths*
Bluebell	*Mertensia spp.Roth*
Bluebunch wheatgrass	*Pseudoroegneria spicata (Pursh) Á. Löve*
Boxelder	*Acer negundo L.*
Broad-leaved (broadlipped) twayblade	*Listera convallarioides (Sw.) Nutt. ex Elliott*
Buckwheat	*Eriogonum Michx.*
Buffalobur (nightshade)	*Solanum rostratum Dunal*
Buffalograss	*Bouteloua dactyloides (Nutt.) J.T. Columbus*
Canada thistle	*Cirsium arvense (L.) Scop.*
Cheatgrass	*Bromus tectorum L.*
Chokecherry	*Prunus virginiana L.*
Cocklebur	*Xanthium spp. L.*
Coiled-beaked (coiled) lousewort	*Pedicularis contorta Benth.*
Columbia needlegrass	*Achnatherum nelsonii (Scribn.) Barkworth*
Columbine	*Aquilegia spp. L.*
Common (lesser) burdock	*Arctium minus Bernh.*
Common crupina	*Crupina vulgaris Cass.*
Common mullein	*Verbascum thapsus L.*
Common snowberry	*Symphoricarpos albus (L.) S.F. Blake*
Common St. Johnswort	*Hypericum perforatum L.*
Common tansy	*Tanacetum vulgare L.*
Common yarrow	*Achillea millefolium L.*
Cottonwood	*Populus spp. L.*
Curl-leaf mountain mahogany	*Cercocarpus ledifolius Nutt.*
Curly dock	*Rumex crispus L.*

Common Name	Scientific Name
Currant	*Ribes spp. L.*
Cusick's (Nuttall's) alkaligrass	*Puccinellia nuttalliana (Schult.) Hitchc.*
Dalmatian toadflax	*Linaria dalmatica (L.) Mill. ssp. dalmatica*
Desert parsley	*Lomatium spp.*
Diffuse knapweed	*Centaurea diffusa Lam.*
Douglas-fir	*Pseudotsuga menziesii (Mirb.) Franco*
Dwarf (short) woolyheads	*Psilocarphus brevissimus Nutt.*
Dwarf mistletoe	*Arceuthobium M. Bieb.*
Dyer's woad	*Isatis tinctoria L*
Fall (Douglas') knotweed	*Polygonum douglasii Greene*
False agoseris	*Agoseris glauca (Pursh) Raf. var. laciniata*
Field bindweed	*Convolvulus arvensis L.*
Field horsetail	*Equisetum arvense L.*
Field pussytoes	*Antennaria neglecta Greene*
Fourwing saltbush	*Atriplex canescens (Pursh) Nutt.*
Fringed sage (prairie sagewort)	*Artemisia frigida Willd.*
Gardner's saltbush	*Atriplex gardneri (Moq.) D. Dietr.*
Goosefoot	*Chenopodium spp. L.*
Greasewood	*Sarcobatus vermiculatus (Hook.) Torr.*
Green ash	*Fraxinus pennsylvanica Marshall*
Green needlegrass	*Nassella viridula (Trin.) Barkworth*
(Hairy) tranquil goldenweed	*Pyrrocoma clementis Rydb.*
Hall's (plains rough) fescue	*Festuca hallii (Vasey) Piper*
Halogeton	*Halogeton glomeratus (M. Bieb.) C.A. Mey.*
Hawthorn	*Crataegus spp. L.*
Houndstongue (gypsyflower)	*Cynoglossum officinale L.*
Idaho fescue	*Festuca idahoensis Elmer*
Indian paintbrush	*Castilleja spp. Mutis ex L. f.*
Indian ricegrass	*Achnatherum hymenoides (Roem. & Schult.) Barkworth*
Japanese brome	*Bromus japonicus Thunb.*
Kentucky bluegrass	*Poa pratensis L.*
Kotzebue's grass of Parnassus	*Parnassia kotzebuei Cham. ex Spreng.*
Large (broadfruit) bur-reed	*Sparganium eurycarpum Engelm.*
Large (lesser) yellow lady's slipper	*Cypripedium parviflorum Salisb.*
Large-leaved (largeleaf) pondweed	*Potamogeton amplifolius Tuck.*
Larkspur	*Delphinium spp. L.*
Leafy (elk) thistle	*Cirsium foliosum (Hook.) DC.*
Leafy spurge	*Euphorbia esula L.*
Leafy wildparsley	*Musineon divaricatum (Pursh) Raf.*
Locoweed	*Oxytropis spp. DC.*
Longleaf (composite) dropseed	*Sporobolus compositus (Poir.) Merr.*
Lupine	*Lupinus spp. L.*
Medusahead	*Taeniatherum caput-medusae (L.) Nevski*
Milkvetch	*Astragalus spp. L.*
Moschatel (muskroot)	*Adoxa moschatellina L.*
Mountain big sagebrush	*Artemisia tridentata Nutt. ssp. vaseyana (Rydb.) Beetle*
Mountain lady's slipper	*Cypripedium montanum Douglas ex Lindl.*
Mountain mahogany (curl-leaf)	*Cercocarpus ledifolius Nutt.*
Musk (nodding plumeless) thistle	*Carduus nutans L.*
Muttongrass	*Poa fendleriana (Steud.) Vasey*
Needle and thread	*Hesperostipa comata (Trin. & Rupr.) Barkworth*
Northern (longleaf) arnica	*Arnica lonchophylla Greene*
Northern blackberry (dwarf raspberry)	*Rubus arcticus L. ssp. acaulis (Michx.) Focke*

Common Name	Scientific Name
Oxeye daisy	*Leucanthemum vulgare Lam.*
Perennial (broadleaved) pepperweed/giant whitetop	*Lepidium latifolium L.*
Perennial (field) sowthistle	*Sonchus arvensis L.*
Phlox	*Phlox spp. L.*
Plains pricklypear	*Opuntia polyacantha Haw.*
Plumeless (spiny plumeless) thistle	*Carduus acanthoides L.*
Porter's sagebrush (wormwood)	*Artemisia porteri Cronquist*
Prairie junegrass	*Koeleria macrantha (Ledeb.) Schult.*
Pretty (bigseed alfalfa) dodder	*Cuscuta indecora Choisy*
Puncturevine	*Tribulus terrestris L.*
Purple loosestrife	*Lythrum salicaria L.*
Quackgrass	*Elymus repens (L.) Gould*
Quaking aspen	*Populus tremuloides Michx.*
Ragwort	*Senecio L.*
Rubber rabbitbrush	*Ericameria nauseosa (Pall. ex Pursh) G.L. Nesom & Baird*
Russet (chamisso's) cottongrass	*Eriophorum chamissonis C.A. Mey.*
Saltgrass	*Distichlis spicata (L.) Greene*
Sand dropseed	*Sporobolus cryptandrus (Torr.) A. Gray*
Sandberg bluegrass	*Poa secunda J. Presl*
Sandwort	*Arenaria spp. L.*
Sartwell's sedge	*Carex sartwellii Dewey*
Saskatoon serviceberry	*Amelanchier alnifolia (Nutt.) Nutt. ex M. Roem.*
Scarlet globemallow	*Sphaeralcea coccinea (Nutt.) Rydb.*
Scotch (cotton) thistle	*Onopordum acanthium L.*
Sea purslane (verrucose seapurslane)	*Sesuvium verrucosum Raf.*
Shadscale saltbush	*Atriplex confertifolia (Torr. & Frém.) S. Watson*
Sheathed musineon (wildparsley)	*Musineon vaginatum Rydb.*
Short-leaf (shortleaved) sedge	*Carex misandra R. Br.*
Showy milkweed	*Asclepias speciosa Torr.*
Shrubby cinquefoil	*Dasiphora fruticosa (L.) Rydb.*
Silver sagebrush	*Artemisia cana Pursh*
Single-headed (pygmy) pussytoes	*Antennaria monocephala DC.*
Skeletonleaf bursage (ragweed)	*Ambrosia tomentosa Nutt.*
Skunkbush sumac	*Rhus trilobata Nutt.*
Slender bulrush	*Schoenoplectus heterochaetus (Chase) Soják*
Slim scurfpea	*Psoralidium tenuiflorum (Pursh) Rydb.*
Slimpod Venus' looking-glass	*Triodanis leptocarpa (Nutt.) Nieuwl.*
Small-flowered-fame flowere (sunbright)	*Phemeranthus parviflorus (Nutt.) Kiger*
Snowberry	*Symphoricarpos spp. Duham.*
Spike fescue	*Leucopoa kingii (S. Watson) W.A. Weber*
Spiny hopsage	*Grayia spinosa (Hook.) Moq.*
Spiny phlox	*Phlox hoodii Richardson*
Spotted knapweed	*Centaurea stoebe L. ssp. micranthos (Gugler) Hayek*
Squirreltail	*Elymus elymoides (Raf.) Swezey*
Sulphur-flower buckwheat	*Eriogonum umbellatum Torr.*
Sweetclover	*Melilotus officinalis (L.) Lam*
Tall larkspur	*Delphinium exaltatum Aiton*
Tamarisk	*Tamarix dioica Roxb. ex Roth*
Teal lovegrass	*Eragrostis hypnoides (Lam.) Britton, Sterns & Poggenb.*
Threadleaf sedge	*Carex filifolia Nutt.*
Three-flowered (three-hulled) rush	*Juncus triglumis L.*
Threetip sagebrush	*Artemisia tripartita Rydb.*

Common Name	Scientific Name
Ute ladies'-tresses	*Spiranthes diluvialis Sheviak*
Violet	*Viola L.*
Watson's goosefoot	*Chenopodium watsonii A. Nelson*
Western wheatgrass	*Pascopyrum smithii (Rydb.) Á. Löve*
White arctic whitlow-grass (Austrian draba)	*Draba fladnizensis Wulfen var. pattersonii (O.E. Schultz) Rollins*
Whitetop	*Cardaria draba (L.) Desv.*
Wild (American) licorice	*Glycyrrhiza lepidota Pursh*
Williams' wafer-parsnip (springparsley)	*Cymopterus williamsii R.L. Hartm. & Constance*
Willow	*Salix spp. L.*
Winterfat	*Krascheninnikovia lanata (Pursh) A. Meeuse & Smit*
Woodland horsetail	*Equisetum sylvaticum L.*
Woods' rose	*Rosa woodsii Lindl.*
Woolly (common) twinpod	*Physaria didymocarpa (Hook.) A. Gray var. lanata A. Nelson*
Wyoming big sagebrush	*Artemisia tridentata Nutt. ssp. wyomingensis Beetle & Young*
Yellow rabbitbrush	*Chrysothamnus viscidiflorus (Hook.) Nutt.*
Yellow toadflax (butter and eggs)	*Linaria vulgaris Mill.*
Zephyr (narcissus) windflower	*Anemone narcissiflora L. var. zephyra (A. Nelson) Dutton & Keener*
Gymnosperms	
Blue spruce	*Picea pungens Engelm.*
Douglas-fir	*Pseudotsuga menziesii (Mirb.) Franco*
Engelmann spruce	*Picea engelmannii Parry ex Engelm.*
Juniper	*Juniperus spp. L.*
Limber pine	*Pinus flexilis James*
Lodgepole pine	*Pinus contorta Douglas ex Loudon*
Ponderosa pine	*Pinus ponderosa Lawson & C. Lawson*
Subalpine fir	*Abies lasiocarpa (Hook.) Nutt.*
Ferns	
Fragile rockbrake	*Cryptogramma stelleri (S.G. Gmel.) Prantl*
Green (brightgreen) splenwort	*Asplenium trichomanes-ramosum L.*
Lance-leaved moonwort (lanceleaf grapefern)	*Botrychium lanceolatum (S.G. Gmel.) Angstr. var. lanceolatum*
Mingan moonwort	*Botrychium minganense Vict.*
Puzzling (peculiar) moonwort	*Botrychium paradoxum W.H. Wagner*
Rattlesnake fern	*Botrychium virginianum (L.) Sw.*
Upward-lobed (trianglelobe) moonwort	*Botrychium ascendens W.H. Wagner*
Fungi	
Blister rust	*Cronartium ribicola*
Fish	
Black bullhead	*Ameirus melas*
Brassy minnow	*Hybognathus hankinsoni*
Brook trout	*Salvelinus fontinalis*
Brown trout	*Salmo trutta*
Catfish	*Ictalurus spp.*
Channel catfish	*Ictalurus punctatus*
Common carp	*Cyprinus carpio*
Creek cub	*Semotilus atromaculatus*
Cutthroat trout	*Oncorhynchus clarki*
Fathead minnow	*Pimephales promelas*
Flathead chub	*Platygobio gracilis*

Common Name	Scientific Name
Green sunfish	*Lepomis cyanellus*
Green sunfish	*Lepomus cyanellus*
Largemouth bass	*Micropterus salmoides*
Longnose dace	*Rhinichthys cataractae*
Longnose sucker	*Catostomus catostomus*
Mountain sucker	*Catostomus platyrhynchus*
Pallid sturgeon	*Scaphirhynchus albus*
Northern plains killifish	*Fundulus kansae*
Plains minnow	*Hybognathus placitus*
Plains topminnow	*Fundulus sciadicus*
Rainbow trout	*Oncorhynchus mykiss*
River carpsucker	*Carpiodes carpio*
Rock bass	*Ambloplites rupestris*
Sand shiner	*Notropis stramineus*
Sauger	*Sander canadensis*
Shovelnose sturgeon	*Scaphirhynchus platorynchus*
Smallmouth bass	*Micropterus dolomieu*
Stonecat	*Noturus flavus*
Sturgeon chub	*Macrhybopsis gelida*
Walleye	*Sander vitreus*
Western silvery minnow	*Hybognathus argyritis*
White sucker	*Catostomus commersoni*
Yellowstone cutthroat trout	*Oncorhynchus clarki bouvieri*
Wildlife	
American marten	*Martes americana*
Badger	*Taxidea taxus*
Baird's sparrow	*Ammodramus bairdii*
Bald eagle	*Haliaeetus leucocephalus*
Beaver	*Castor canadensisis*
Beet leafhopper	*Circulifer tenellus*
Bighorn Mountain pika	*Ochotona princeps obscura*
Bighorn Mountain snowshoe hare	*Lepus americanus seclusus*
Black bear	*Ursus americanus*
Blackbilled cuckoo	*Coccyzus erythropthalmus*
Black-tailed prairie dog	*Cynomys ludovicianus*
Blue heron	*Ardea herodias*
Bobcat	*Lynx rufus*
Boreal chorus frog	*Pseudacris triseriata*
Boreal owl	*Aegolius funereus*
Brewer's sparrow	*Spizella breweri*
Bull snake	*Pituophis catenifer*
Burrowing owl	*Speotyto cunicularia*
Calliope hummingbird	*Stellula calliope*
Chukar partridge	*Alectoris chukar*
Columbian sharp-tailed grouse	*Tympanuchus phasianellus columbianus*
Common loon	*Gavia immer*
Common merganser	*Mergus merganser*
Cormorant	*Phalacrocorax spp.*
Cottontail rabbit	*Sylvilagus spp.*
Coyote	*Canis latrans*
Eastern racer	*Coluber constrictor*
Elk	*Cervus elaphus*
Ferruginous hawk	*Buteo regalis*

Common Name	Scientific Name
Fisher	*Martes pennanti*
Fox squirrel	*Sciurus niger*
Fringed myotis	*Myotis thysanodes*
Garter snake	*Thamnophis sirtalis*
Golden eagle	*Aquila chrysaetos*
Gopher	*Gopherus spp.*
Gopher snake	*Pituophis catenifer*
Gray partridge	*Perdix perdix*
Gray squirrel	*Sciurus carolinensis*
Gray wolf	*Canis lupus*
Great horned owl	*Bubo virginianus*
Greater Sage-Grouse	*Centrocercus urophasianus*
Ground squirrel	*Spermophilus spp.*
Hayden's shrew	*Sorex haydeni*
Hispid pocket mouse	*Chaetodipus hispidus*
Hoary bat	*Lasiurus cinereus*
Horse	*Equus ferus caballus*
Hungarian partridge	*Perdix perdix*
Jackrabbit	*Lepus spp.*
Leopard frog	*Rana pipiens*
Long-eared owl	*Asio otus*
Marten	*Martes spp.*
Mink	*Mustela vison*
Moose	*Alces alces*
Mountain lion	*Puma concolor*
Mountain plover	*Charadrius montanus*
Mule deer	*Odocoileus hermionus*
Muskrat	*Ondata zibethicus*
North American wolverine	*Gulo gulo luscus*
Northern goshawk	*Accipiter gentilis*
Northern harrier	*Circus cyaneus*
Northern leopard frog	*Rana pipiens*
Northern long-eared bat	*Myotis septentrionalis*
Peregrine falcon	*Falco peregrinus*
Piping plover	*Charadrius melodus*
Pheasant	*Phasianus colchicus*
Plains gartersnake	*Thamnophis radix*
Plains harvest mouse	*Reithrodontomys montanus*
Plains pocket gopher	*Geomys bursarius*
Porcupine	*Erethizon dorsatum*
Prairie falcon	*Falco mexicanus*
Prairie rattlesnake	*Crotalus viridis*
Pronghorn	*Antilocapra americana*
Pygmy nuthatch	*Sitta pygmaea*
Pygmy rabbit	*Brachylagus idahoensis*
Raccoon	*Procyon lotor*
Rail	*family Rallidae*
Red fox	*Vulpes vulpes*
Red squirrel	*Tamiasciurus hudsonicus*
Red-tailed hawk	*Buteo jamaicensis*
Ring-necked pheasant	*Phasianus colchicus*
Sage sparrow	*Amphispiza belli*
Sage thrasher	*Oreoscoptes montanus*

Common Name	Scientific Name
Sagebrush lizard	*Sceloporus graciosus*
Sagebrush vole	*Lemmiscus curtatus*
Short-eared owl	*Asio flammeus*
Snipe	*Gallinago spp.*
Snowshoe hare	*Lepus americanus*
Spotted bat	*Euderma maculatum*
Spotted frog	*Rana luteiventris*
Spotted skunk	*Spilogale gracilis*
Striped skunk	*Mephitis mephitis*
Swainson's hawk	*Buteo swainsoni*
Swift fox	*Vulpes velox*
Terrestrial gartersnake	*Thamnophis elegans*
Three-toed woodpecker	*Picoides dorsalis*
Tiger salamander	*Ambystoma tigrinum mavortium*
Townsend's big-eared bat	*Corynorhinus townsendii*
Trumpeter swan	*Cygnus buccinator*
Turkey	*Meleagris gallopavo*
Turkey vulture	*Cathartes aura*
Virginia's warbler	*Vermivora virginiae*
Vole	*Microtus spp.*
Water vole	*Arvicola amphibius*
Weasel	*Mustela spp.*
Western burrowing owl	*Athene cunicularia hypugea*
White-faced ibis	*Plegadis chihi*
White-tailed deer	*Odocoileus virginianus*
Wild turkey	*Meleagris gallopavo*
Williamson's sapsucker	*Sphyrapicus thyroideus*
Woodhouse's toad	*Bufo woodhousii*
Wyoming ground squirrel	*Spermophilus elegans*
Yellow-billed cuckoo	*Coccyzum americanus*
Yuma myotis	*Myotis yumanensis*
Invertebrates	
Mosquito	*Anopheles spp.*
Grasshopper	*suborder Caelifera; order Orthoptera*
Mussel	*various*
Crayfish	*various*
Mountain pine beetle	*Dendroctonus ponderosae*
Mormon cricket	*Anabrus simplex*
Alfalfa weevil	*Hypera postica gyllenhal*
*Names in parentheses are United States Department of Agriculture Plants Database common name. Source: BLM 2011c	

Table K.2. Special Status Plant Species Potentially Occurring in the Planning Area

Common Name	Habitat	Status
Ute ladies'-tresses orchid	Mesic to wet riparian meadows, marshes, and stream banks.	Threatened
Williams' wafer-parsnip	Open ridgetops and upper slopes with exposed limestone outcrops or rock slides 6,000 to 8,300 feet.	BLM Sensitive Plant Species, WYNDD Plant Species of Concern
Porter's sagebrush	Sparsely vegetated badlands of ashy or tufaceous mudstones and clay slopes.	BLM Sensitive Plant Species, WYNDD Plant Species of Concern

Common Name	Habitat	Status
Limber pine	Mountains, associated with high elevation conifer species.	BLM Sensitive Plant Species
Alpine poppy	Open, rocky slopes with delayed snowmelt in the alpine zone.	WYNDD Plant Species of Concern
Blue elderberry	Stream banks, riverside woodlands, and open areas in the forest understory.	WYNDD Plant Species of Concern
Broad-leaved twayblade	Grows with moss and grasses in damp, often shady, spots with cool, moist growing conditions.	WYNDD Plant Species of Concern
Coil-beaked lousewort	Ridge tops and meadows in the upper subalpine and alpine zones.	WYNDD Plant Species of Concern
Cusick's alkali-grass	Moist riparian areas and alkaline seeps and draws.	WYNDD Plant Species of Concern
Dwarf woolly-heads	Drying mud of ponds and other vernally wet soil in the valleys and on the plains.	WYNDD Plant Species of Concern
Fall knotweed	Gravelly or sandy hills and plains.	WYNDD Plant Species of Concern
False agoseris	Wetland riparian areas.	WYNDD Plant Species of Concern
Field pussytoes	Sub-irrigated meadows within broad stream channels.	WYNDD Plant Species of Concern
Fragile rockbrake	Sheltered calcareous cliff crevices and rock ledges, typically in coniferous forest or other boreal habitats.	WYNDD Plant Species of Concern
Green spleenwort	Rock crevices in forest cover.	WYNDD Plant Species of Concern
Hairy tranquil goldenweed	Sagebrush grasslands and montane meadows, often on limestone substrates.	WYNDD Plant Species of Concern
Hall's fescue	Montane meadows, slopes, and edges of open coniferous woods and meadows. Usually on soils derived from calcareous parent material or volcanic soils.	WYNDD Plant Species of Concern
Kotzebuei's grass-of-parnassus	Mesic to wet arctic and alpine habitats at high elevation.	WYNDD Plant Species of Potential Concern
Lance-leaved moonwort	Mature as well as second-growth mesic northern hardwood forests in soil with a rich humus layer.	WYNDD Plant Species of Concern
Large bur-reed	Continuous fringe with sedges, flags, and reeds along the sides of a river or stream.	WYNDD Plant Species of Concern
Large yellow lady-slipper	Moist woods and bogs.	WYNDD Plant Species of Concern
Large-leaved pondweed	Riparian wetland areas.	WYNDD Plant Species of Concern
Leafy thistle	Moist soil, grasslands, meadows, edges, and openings in boreal forest, subalpine forests, and alpine slopes.	WYNDD Plant Species of Concern
Longleaf dropseed	Open forests and grasslands on the plains.	WYNDD Plant Species of Concern
Mingan moonwort	Dense shade, sparse understory, with an alluvium substrate.	WYNDD Plant Species of Concern
Moschatel	Clay soils and shaded areas in fields and woodland areas.	WYNDD Plant Species of Concern
Mountain lady-slipper	Dry or moist, open or lightly shaded, brushy or wooded valleys and slopes.	WYNDD Plant Species of Concern

Common Name	Habitat	Status
Northern arnica	Open woods and slopes on sandy-gravel or limestone and shady, moist north-facing birch-hazelnut forests from 6,500 to 8,000 feet.	WYNDD Plant Species of Potential Concern
Northern blackberry	Damp soils in sunny-edged woodlands.	WYNDD Plant Species of Concern
Pretty dodder	Floodplains of creeks and streams.	WYNDD Plant Species of Concern
Puzzling moonwort	Mesic to wet subalpine mountain meadows dominated by grasses, sedges, and in some cases, dense herbaceous cover.	WYNDD Plant Species of Concern
Rattlesnake fern	Rich moist or dry woods, moist thickets, or higher spots in bogs.	WYNDD Plant Species of Concern
Russet cotton-grass	Wet areas, preferably the acidic, nutrient-poor conditions of peatlands.	WYNDD Plant Species of Potential Concern
Sartwell's sedge	Dense large stands, rich fens and swamps, and sometimes on the edges of ponds.	WYNDD Plant Species of Concern
Sea purslane	Damp, sandy locations such as mangroves, beaches, dunes, salt flats, and marsh edges.	WYNDD Plant Species of Concern
Sheathed musineon	This species is found on rocky slopes, and in meadows, aspen groves, and ponderosa pine communities.	WYNDD Plant Species of Concern
Short-leaf sedge	Wet meadows, along stream banks, in willow thickets, and in stony or turfy places in the alpine and upper subalpine zones.	WYNDD Plant Species of Concern
Single-head pussytoes	Wind-swept, open slopes and ridges in alpine or subalpine tundra. Areas dominated by forbs and bunchgrass with occasional patches of whitebark pine and Engelmann spruce.	WYNDD Plant Species of Concern
Slender bulrush	Lake edges and wetlands.	WYNDD Plant Species of Concern
Slim-pod Venus' looking-glass	Dry, sandy prairies, pastures, and disturbed areas.	WYNDD Plant Species of Concern
Small-flowered fame flower	Bare sandy, acidic soils overlying rocks.	WYNDD Plant Species of Concern
Teal love grass	Borders of streams and rivers, edge of ponds and lakes, or in sloughs.	WYNDD Plant Species of Concern
Three-flower rush	Montane stream banks, bogs, and short willow and sedge meadows on wet to saturated soils, sometimes influenced by limestone.	WYNDD Plant Species of Concern
Upward-lobe moonwort	Well-drained natural and artificially maintained habitats including alpine meadows, avalanche meadows, pastured forest meadows and grassy roadsides.	WYNDD Plant Species of Concern
Watson goosefoot	Found in a variety of habitats from desert, cliffs, talus, and moist shaded areas under aspen, junipers, or pinyons, often in riparian habitats.	WYNDD Plant Species of Concern
White arctic whitlow-grass	Found in talus and scree, on rocky slopes and flats, and in alpine meadows.	WYNDD Plant Species of Concern

Common Name	Habitat	Status
Woodland horsetail	Lowland wet conifer forests and mixed upland, dry conifer, and deciduous forest habitats. Moist open woods, bogs, swamps, prairies, meadows, and stream banks.	WYNDD Plant Species of Concern
Woolly twinpod	Extending from plains to montane zones.	WYNDD Plant Species of Concern
Zephyr windflower	Big Horn Mountains from fellfields to alpine meadows, to tundra. Usually moist or swampy soil.	WYNDD Plant Species of Concern

Source: BLM 2010d; Keinath et al. 2003; Heidel 2012
BLM Bureau of Land Management
WYNDD Wyoming Natural Diversity Database

Table K.3. Fish Species of Importance within the Planning Area

Common Name	Habitat	Status				
		Federal Threatened (T), Endangered (E) or Candidate (C) Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	TNC Primary (P) and Secondary (S) Target Species
Brassy Minnow	Weedy streams, clear creeks with sand and gravel bottoms, and occasionally in lakes.				SGCN NSS4	
Flathead chub	Turbid waters.			X	SGCN NSS4	S
Goldeye	Tolerant of widely fluctuating environmental conditions, such as turbidity, salinity, and water temperature.				SGCN NSS3	
Mountain whitefish	Prefers deep, fast water in large, clear cold rivers. Sometimes abundant in lakes.				SGCN NSS4	

Common Name	Habitat	Status				
		Federal Threatened (T), Endangered (E) or Candidate (C) Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	TNC Primary (P) and Secondary (S) Target Species
Pallid sturgeon	Moderate to swift river currents and turbid waterways, depths 3 to 24 feet, with sandy substrates.	E				P
Plains minnow	Large, turbid streams, slow water and side pool habitat.			X	SGCN NSS3	S
Sauger	Large rivers, but may also be found in reservoirs. Tolerant of turbid waters.				SGCN NSS3	
Shovelnose sturgeon	River bottoms, often in areas with swift current and sand or gravel bottom and turbid water.				SGCN NSS3	
Sturgeon chub	Turbid water with moderate to strong current over bottoms ranging from rocks and gravel to coarse sand.			X	SGCN NSS1	P
Western silvery minnow	Sluggish pools and backwaters, usually over mud or sand, of small to large rivers.				SGCN NSS2	
Yellowstone cutthroat trout	Relatively clear, cold creeks, rivers, and lakes at temperatures between 4 and 15 degrees Celsius.		X	X	SGCN NSS2	

Common Name	Habitat	Status				
		Federal Threatened (T), Endangered (E) or Candidate (C) Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	TNC Primary (P) and Secondary (S) Target Species

Source: WGFD 2010b; BLM 2010d; Keinath et al. 2003; BLM 2003c

BLM Bureau of Land Management
NSS1 Native Species Status 1
NSS2 Native Species Status 2
NSS3 Native Species Status 3
NSS4 Native Species Status 4
SGCN Species of Greatest Conservation Need
TNC The Nature Conservancy
USFS United States Forest Service
WGFD Wyoming Game and Fish Department

Table K.4. Wildlife Species of Importance Potentially Occurring within the Planning Area

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Big Game										
Moose	Engelmann spruce, Douglas-fir and subalpine fir, and lodgepole pine forests plus associated habitats.				SGCN NSS4					
Upland Game										
Greater Sage-Grouse	Sagebrush habitats.	C	X	X	SGCN NSS2		I	X		S
Blue grouse	Coniferous forests, aspen, willow, mountain park-meadows, logged forests. Nests on the ground.						III	X		
Birds of Prey										
Bald eagle	Near large lakes and rivers in forested habitat where adequate prey and old, large-diameter cottonwood or conifer trees are available for nesting.		X	X	SGCN NSS2	X	I			P
Boreal owl	Mature, high elevation forests of Engelmann spruce, subalpine fir, and lodgepole pine interspersed mature aspen.				SGCN NSS3		II	X		

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Eastern screech owl	Open woodlands, deciduous forests, wooded urban areas, cottonwood-riparian. Nests in tree cavities or hallow stump.						II			
Ferruginous hawk	Arid and semiarid grassland regions with is open, level, or rolling prairies. Foothills or middle elevation plateaus largely devoid of trees, and cultivated shelterbelts or riparian corridors.		X	X	SGCN NSSU	X	I	X		
Flammulated owl	Montane forests, especially ponderosa pine.			X		X				
Golden eagle	Most habitats with open areas for foraging. Nests in a tree or on a cliff.					X	III			
Merlin	Open woodlands, savannah, grasslands, and shrub-steppe. Nest in large trees usually in old domed magpie nests, in open woodlands within a short distance of open sagebrush-grassland.				SGCN NSSU		II			

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Northern goshawk	Mature, high-elevation forests of Engelmann spruce, subalpine fir, and lodgepole pine interspersed with mature aspen stands. Need a home range of over 2,500 acres.		X	X	SGCN NSSU		I			
Northern harrier	Open country, like grasslands, steppes, wetlands, meadows, cultivated areas, and tundra. Nests on the ground in thick grass, shrubbery, or other vegetation			X			III			
Peregrine falcon	Open habitats from open woodlands and forests to shrub-steppe, grasslands, marshes, and riparian habitats. Nests in cliffs.		X	X	SGCN NSS3	X	I			P
Prairie falcon	Cliffs in all habitats with open areas. Nests in a hole or on a ledge on a cliff or rock outcrop.					X	III			
Short-eared owl	Broad expanses of open habitat with dense, low vegetation, including prairies, grasslands, marshes, and open sagebrush shrublands. Dependent on the meadow vole, which comprises at least 90% of its diet.			X	SGCN NSS4	X	I	X		

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Swainson's hawk	Open grasslands, prairies, farmlands, and deserts that have some trees for nesting.				SGCN NSSU		I	X		
Western burrowing owl	Arid and semiarid environments, with well-drained, level to gently sloping areas characterized by sparse vegetation and bare ground. It prefers open prairie, grassland, desert, and shrub-steppe habitats, and may also inhabit agricultural areas. Dependent on burrowing mammals, like prairie dogs and ground squirrels.		X	X	SGCN NSSU	X	I			S
Migratory Birds (excluding birds of prey)										
American avocet	Marshes, ponds, shorelines. Nests on the ground close to water among tufts of vegetation.						III			
American bittern	Marshes with open water in the center, gradual slopes, a band of emergent vegetation around the periphery, and idle grassland in the adjacent uplands.			X	SGCN NSS3	X	I			
American dipper	Swift mountain streams. Nests on a cliff face, behind a waterfall, or on a midstream rock.						II			

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American three-toed woodpecker	Coniferous forests, primarily above 8,900 feet. Must include unfragmented blocks of old-growth and an abundance of dying trees with occasional disturbances.			X	SGCN NSSU		II			
American white pelican	Rivers, streams, lakes, ponds, and marshes. Nests colonially on large freshwater lakes, and requires islands isolated from mammalian predators.						II			P
American wigeon	Marshes, lakes, mostly below 8,000 feet.								MH	
Baird's sparrow	Native mixed-grass and fescue prairie.		X			X	I	X		S
Barrow's goldeneye	Montane and subalpine lakes and rivers, beaver ponds, and small sloughs. Nests almost exclusively in tree cavities.				SGCN NSS3		IV			
Black-backed woodpecker	Lodgepole pine, Douglas-fir, Engelmann spruce-subalpine fir, especially those forests that have been burned. Nests in a cavity in a conifer.			X	SGCN NSSU		II			

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Black-billed cuckoo	Deciduous and mixed coniferous/deciduous forests, open woodlands, especially cottonwood-riparian, urban areas. Nests against tree trunk, on a log, occasionally in vine tangles.			X		X	II			
Black-billed magpie	All habitats below 8,000 feet. Nest is large and conspicuous in a small tree or shrub.						IV			
Black-chinned hummingbird	Basin-prairie shrublands, riparian shrub. Nests on a small limb of a deciduous tree, often near or over a stream.						II			
Black-crowned night heron	Marshes, swamps, wooded streams, and shores of lakes and ponds. Nests in colonies in emergent vegetation or in shrubs near the edge of water.				SGCN NSS3					
Black-headed grosbeak	Aspen and riparian woodlands below 8,000 feet. Nests in a deciduous tree or shrub.						IV			
Black rosy-finch	Alpine grasslands, alpine moss-lichen-forb, barren ground, fallow agricultural areas. Nests on the ground or on a cliff.				SGCN NSSU	X	III			

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Black tern	Biologically rich marshes and aquatic areas. Prefers marshes or marsh complexes greater than 50 acres. Nests in small, loose colonies, generally in areas of still water, with 25% to 75% of the surface covered by emergent vegetation, and well-interspersed with open water.			X	SGCN NSS3		I			
Black-throated gray warbler	Pine-juniper, woodland chaparral, mountain-foothills shrublands. Nests far out on a horizontal branch, usually in a conifer.						III			
Blue-winged teal	Marshes and lakes in association with most habitats below 8,000 feet. Nests on ground in good vegetative cover.								MH	
Bobolink	Grasslands; large expanses of grass or forb cover.				SGCN NSS4		II			
Brewer's sparrow	Northern Rocky Mountains including sagebrush and alpine meadows.		X	X	SGCN NSS4		I	X		

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Broad-tailed hummingbird	Riparian shrub; mountain-foothills grasslands; coniferous forests; wet-moist meadows within Douglas-fir, Engelmann spruce-subalpine fir, other coniferous or mixed forests, and aspen.						II			
Brown creeper	Coniferous forests, aspen, cottonwood-riparian. Nests in a cavity excavated in a rotten branch or stump, occasionally in a deserted woodpecker cavity.						II			
Bufflehead	Aspen; cottonwood-riparian; marshes; lakes and rivers associated with lodgepole pine, Douglas-fir, and other mixed coniferous forests. Nests in a cavity, usually in a dead tree.						IV			
Bullock's oriole	Cottonwood-riparian, cottonwood-dryland, rural developments, urban areas. Nests in deciduous trees; nests usually hung from a drooping branch.						III			
California gull	Large lakes, scavenges in most open habitats below 8,000 feet. Nests on sticks and dried weeds on the ground close to water.						IV			

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Calliope hummingbird	Coniferous forests, woodland-chaparral, mountain foothills shrublands, riparian shrub, mountain park-meadows, alpine grasslands. Nests on a limb of a tree or on a conifer cone.						II			
Canvasback	Deep, open, permanent ponds, marshes and potholes. Breeding may occur in small lakes, deep-water marshes, sheltered bays of large freshwater and alkali lakes, permanent and semi-permanent ponds, sloughs, potholes, and shallow river impoundments.				SGCN NSS3		IV		MH	
Canyon wren	Cliffs in canyons and mountains; rock outcrops/rock piles in pine-juniper, woodland-chaparral, basin-prairie and mountain-foothills shrublands. Nests in a crevice or cave on a bank or cliff.						III			

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Cassin's finch	Coniferous forests up to timberline, including burns. Nests in a conifer, nest is usually placed near the end of a large limb.					X	IV			
Cassin's kingbird	Ponderosa pine savannah, pine-juniper, cottonwood-riparian, cottonwood-dryland, woodland-chaparral, basin-prairie and mountain-foothills shrublands. Nests on a horizontal branch near the trunk of a tree.						II			
Caspian tern	Marshes and aquatic areas; prefers open areas with sparse vegetation. Nests in small colonies on sandy or gravelly beaches along lakes, rivers, and marshes.				SGCN NSS3					
Chestnut-collared longspur	Shortgrass and open mixed-grass prairies. Prefers relatively mesic areas. Low, moist areas and wet-meadow zones around wetlands may provide suitable habitat.			X	SGCN NSS4	X	II			S
Chimney swift	Feeds in the air over many habitats below 7,500 feet, especially in urban areas. Nests in a hollow tree or chimney or other suitable human-built structure.						IV			

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Cinnamon teal	Marshes and lakes in association with most habitats below 8,000 feet. Nests on the ground in a marsh or meadow.						IV			
Clark's grebe	Marshes and lakes, usually with extensive areas of open water and bordered by tall emergent vegetation. Nests in areas that provide large clumps of emergent vegetation interspersed with open water so that the vegetation blocks wave action.				SGCN NSS4					
Clark's nutcracker	Coniferous forests, aspen, cliffs in canyons or mountains, juniper-sagebrush, ponderosa pine-juniper. Nests on a horizontal limb of a mature conifer.						III			
Clay-colored sparrow	Ponderosa pine savannah, pine-juniper, aspen, cottonwood-riparian, mountain-foothills shrublands, sagebrush-grasslands, shelterbelts. Nests in a shrub or on the ground.						IV			

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Common loon	Lakes at least 10 acres, secluded from humans, with clear water, and islands or protected shores for nesting between 6,000-8,000 feet.				SGCN NSS1		II			
Common poorwill	A variety of habitats below 8,000 feet including pine-juniper, woodland-chaparral, basin prairie and mountain-foothills shrublands, grasslands, agricultural areas. Nests on the ground.						III			
Dickcissel	Grasslands with taller grasses, forbs, or shrubs, but also uses alfalfa and hayfields.				SGCN NSS4		II	X		
Dusky flycatcher	Ponderosa pine savannah, pine-juniper, aspen, cottonwood-riparian, woodland-chaparral, riparian shrub. Nests in the crotch of a juniper or sagebrush, or near the base of a thorny shrub.						II			
Forester's tern	Freshwater marshes and marshy borders of ponds and lakes, and prefers large marsh complexes with vegetated nests sites near patches of open water.				SGCN NSS3		I			

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Franklin's gull	Marshes and sloughs with sparse emergent vegetation. Nests in colonies in marshes no denser than 10 plants less than 1 meter tall per square meter, and usually near patches of open water.				SGCN NSS3		I			S
Golden-crowned kinglet	Coniferous forests, aspen-conifer. Nest is hung from branches near the trunk of a conifer.						II			
Grasshopper sparrow	Shortgrass prairies, mixed grasslands, meadows, open sagebrush-grasslands, and agricultural areas.			X	SGCN NSS4	X	II			
Green-tailed towhee	Mixed coniferous forests, woodland-chaparral, juniper-sagebrush, basin-prairie and mountain-foothills shrublands, riparian shrub.						IV			

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Harlequin duck	Cold, shallow, rapid mountain streams away from concentrated human activities. Nests on ground along streams with less than 5% gradient, dense shrubs lining the banks, braided channels, swift currents, abundant aquatic insects, and good water quality.			X	SGCN NSS3		II			
Harris's sparrow	Deciduous forests, agricultural areas, urban areas.							X		
Lark bunting	Shortgrass and mixed-grass prairies, as well as disturbed grasslands, sagebrush grassland and shrub-steppe habitats, mountain-foothill shrublands, and agricultural areas.				SGCN NSS4		II			
Lark sparrow	Pine-juniper, woodland-chaparral, basin-prairie and mountain-foothills shrublands, grasslands, agricultural areas. Nests in hollow depression on the ground.						II			

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Lazuli bunting	Pine-juniper, woodland chaparral, mountain-foothills shrublands with aspen, cottonwood-riparian.						III			
Lesser scaup	Permanent, intermittently exposed, and semipermanent wetlands 2 acres in size or greater. Nest in uplands, usually close to water's edge.				SGCN NSS3				H	
Lewis' woodpecker	Ponderosa pine savannah, pine-juniper, other coniferous forests, aspen, cottonwood-riparian, below 8,500 feet. Nests in a cavity in a dead tree or live tree on in a pole.			X	SGCN NSSU	X	II	X		
Loggerhead shrike	Grasslands interspersed with scattered trees and shrubs that provide nesting and perching sites.		X	X		X	II			
Long-billed curlew	Plains, grasslands, and prairies. Nests on the ground in habitat that usually includes: grass less than 12 inches high; bare ground; shade; abundant invertebrate prey; and a minimum of suitable habitat.		X	X	SGCN NSS3	X	I	X		

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MacGillivray's warbler	Aspen, cottonwood-riparian, riparian shrub, below 9,000 feet. Nests close to the ground in dense shrubs.						II			
Mallard	Marshes and lakes in association with most habitats below 9,000 feet. Nests on ground near water.								H	
Marbled godwit	Wet-moist meadow grasslands, marshes, aquatic areas, shorelines, irrigated native meadows.					X		X		
Marsh wren	Marshes. Nest is attached to reeds.						II			
McCown's longspur	Open, dry, sparsely vegetated areas. It prefers shortgrass prairie and basin-prairie shrubland habitats, and also inhabits plowed and stubble fields, grazed pastures, dry lake beds, and other sparse, bare, dry ground.			X	SGCN NSS4	X	I	X		
Mountain bluebird	Most habitats with nesting cavities and open areas for foraging. Nests usually in a woodpecker cavity in a snag.						IV			
Mountain chickadee	Coniferous forest, aspen, juniper-sagebrush. Nests in a natural or woodpecker cavity in a tree or snag.						IV			

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Mountain plover	Low, open habitats such as arid shortgrass, and mixed grass prairies dominated by blue grama and buffalograss with scattered clumps of cacti and forbs, and saltbush habitats of the shrub-steppe of central and western Wyoming.		X	X	SGCN NSSU	X	I	X		P
Northern bobwhite	Cottonwood-riparian, riparian shrub, agricultural areas. Nests on the ground.						IV			
Northern pintail	Marshes and lakes below 8,000 feet in elevation.				SGCN NSS3				H	
Northern rough-winged swallow	Adjacent to aquatic areas. Forages over a variety of habitats below 8,000 feet.						III			
Olive-sided flycatcher	Coniferous forests from 8,000 feet to timberline, aspen-riparian. Nests often high in a conifer on a horizontal branch.			X			II	X		
Ovenbird	Aspen, cottonwood-riparian. Nests on the leaf-covered forest floor.						III			
Pinyon jay	Ponderosa pine savannah, pine-juniper, woodland-chaparral, mountain-foothills shrublands. Nests in a juniper or pine, occasionally an oak.					X	IV	X		

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Plumbeous vireo	Douglas-fir, ponderosa pine savannah, ponderosa pine-Douglas-fir, other or mixed coniferous forests, aspen, cottonwood-riparian. Nests in a conifer, occasionally an oak.						II			
Pygmy nuthatch	Ponderosa pine forests, although it also occurs in other coniferous habitats. It prefers mature to old-growth stands that are fairly open with a component of vigorous trees of intermediate age.				SGCN NSSU		II			
Redhead	Permanently and semipermanently flooded palustrine wetlands. Also may inhabit cropland ponds, alkali lakes, sewage ponds, reservoirs, stream, and oxbows.				SGCN NSS3		IV		MH	
Red-headed woodpecker	Cottonwood-riparian, ponderosa pine savannah. Nests in a cavity in a barkless dead tree or a stub on a live tree.					X	III	X		
Red-naped sapsucker	Aspen and cottonwood-riparian from 5,000 to 9,000 feet. Also coniferous forests. Nests in cavity in a deciduous tree, often near water.						II			

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Rock wren	Rock outcrops/rock piles in pine-juniper, woodland-chaparral, basin-prairie and mountain-foothills shrublands, grasslands. Nests in a hole or crevice, often under or around rocks.						III			
Rufous hummingbird	Riparian shrub; mountain-foothills grasslands; coniferous forests; wet-moist meadows within lodgepole pine, Douglas-fir, other coniferous or mixed forests, aspen, and mountain-foothills shrublands.						II	X		
Sage sparrow	Sagebrush flats, alkaline flats with saltbush, and semi-desert shrublands in the lowlands.		X	X	SGCN NSS4	X	I			
Sage thrasher	Open, shrub-steppe country dominated by sagebrush or bitterbrush, with native grasses intermixed, generally avoiding cheatgrass-dominated landscapes.		X		SGCN NSS4	X	II			

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Sandhill crane	Wet-moist meadow grasslands, sedge meadows, irrigated native and introduced meadows, small grains, marshes. Nests on the ground.				SGCN NSS4		IV			
Say's phoebe	Basin-prairie shrublands, grasslands. Nests in a cliff or bank, occasionally under an eave or bridge.						III			
Snowy egret	Grassy marshes, reservoirs, lakes, ponds, and wet meadows. Nests in mixed colonies in emergent vegetation or in shrubs on islands.				SGCN NSS3					
Townsend's solitaire	Coniferous forests, aspen. Nests often amid tree roots or other shelter on the ground.						II			
Trumpeter swan	Foraging grounds during migration include wetlands, lakes and reservoirs.		X	X	SGCN NSS2		I			
Upland sandpiper	Open grasslands, including prairies, meadows, pastures, hayfields, alfalfa fields, and highway rights-of-way.				SGCN NSSU	X	I			

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Veery	Aspen, cottonwood-riparian, coniferous forests, below 9,000 feet. Nests on the ground or in a shrub.						III			
Vesper sparrow	Basin-prairie and mountain-foothills shrublands, grasslands, and agricultural areas.						II			
Virginia's warbler	Pinyon-juniper, woodland chaparral. Nests on the ground, usually hidden by vegetation.						III			
Warbling vireo	Deciduous and coniferous forests, urban areas.						IV			
Western bluebird	Pine-juniper, juniper woodlands, associated with edges. Often nests in a woodpecker cavity in a snag.						II			
Western grebe	Marshes and lakes, usually with extensive areas of open water and bordered by tall emergent vegetation. Nests in areas that provide large clumps of emergent vegetation interspersed with open water so that the vegetation blocks wave action.						III			

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Western tanager	Coniferous and deciduous forests. Usually nests in a conifer, in a fork or on a horizontal branch, well out from the trunk.						IV			
Whimbrel	Marshes, ponds, lakes, shorelines.							X		
White-faced ibis	Shallow lake waters, muddy ground of wet meadows, marshes, ponds, lakes, rivers, flooded fields, and estuaries.		X		SGCN NSS3					
White-throated swift	Aerially feeds over most habitats with cliffs below 9,000 feet. Nests deep in a crack or crevice of a rock wall.						II	X		
Willet	Wet-moist meadow grasslands, marshes, irrigated native meadows, shorelines. Nest on the ground, commonly on exposed beach or shore.						III			
Williamson's sapsucker	Coniferous forests, especially those that have burned. Also aspen. Nests in cavity in and aspen, pine, or fir.						II			

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Willow flycatcher	Riparian obligate: Uses willow or alder thickets along streams, especially where streams are bordered by open stands of cottonwoods.				SGCN NSS4	X	II	X		
Wilson's phalarope	Marshes, lakes, and shorelines. Nests on damp ground near water.						I	X		
Wilson's warbler	Riparian shrub from 7,000 to 10,500 feet. Usually nests on the ground, often in a vine tangle.						II			
Wood duck	Cottonwood-riparian, marshes, lakes, rivers. Nests in a tree cavity.			X			IV	X		
Yellow-billed cuckoo	Riparian obligate: Prefers extensive areas of dense thickets and mature deciduous forests near water, and requires low, dense, shrubby vegetation for nest sites.		X	X	SGCN NSSU		II			
Mammals										

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Big brown bat	Man-made and natural roosts, including tree cavities, rock crevices, caves, abandoned mines and bridges in a wide variety of habitats and elevations, including cottonwood riparian woodlands, sagebrush-steppe, juniper woodlands, conifer forests, and aspen woodlands.				SGCN NSS4					
Black-footed ferret	Shortgrass and midgrass prairies in close association with prairie dog colonies.	E			SGCN NSS1					
Black-tailed prairie dog	Dry, flat, open, shortgrass and mixed-grass grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle.		X	X						P
Bobcat	Habitat varies widely from forests and mountainous areas to semi-deserts and brush land.									S

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Dwarf shrew	Rocky areas such as talus slopes in a variety of habitats, from alpine tundra through subalpine forests and rock slides, and, at lower elevations, from montane forests and foothills to arid shortgrass prairie.				SGCN NSS3					
Fisher	Extensive coniferous forests (mature to late successional) with a high degree of continuous overhead cover.				SGCN NSSU					
Fringed myotis	Hot desert scrubland, grassland, xeric woodland, sagegrass steppe, mesic old growth forest, and multiaged sub-alpine coniferous and mixed deciduous forest. Xeric woodlands (oak and pinyon juniper).		X		SGCN NSS3					
Hayden's shrew	Grasslands, prairies, marshes, riparian areas, and wet meadow. Nests under logs or rocks or in crevices.				SGCN NSS4					
Hispid pocket mouse	Rocky or gravelly areas with heavy soils in dry grassland habitats.				SGCN NSS3					

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		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Least weasel	Burrows made by a vole or mole in rolling gentle ridges dominated by sagebrush and grasses that are divided by riparian habitats of willows and cottonwoods.				SGCN NSSU					
Little brown myotis	Coniferous forest, riparian areas, woodlots, shelterbelts, and urban areas. Roosts in buildings, tree cavities, loose tree bark, bridges, rock crevices, caves, and abandoned mines.				SGCN NSS4					
Long-eared myotis	Coniferous forests in mountain areas. Roosts in small colonies in caves, buildings, and under tree bark.		X		SGCN NSS3					
Long-legged myotis	Open, mature forests with standing dead trees. Roosts in tree cavities, buildings, rock crevices, caves, abandoned mines, and under loose bark.				SGCN NSS3					
Marten	Mature and old-growth conifer and mixed stands. Dens in tree cavities, rotten logs, and underground.			X						
Mountain lion	Typically found in remote areas that have dense cover and rocky, rugged terrain.									S

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
North American wolverine	Subalpine coniferous forests, especially dense, continuous stands in remote mountain areas, and alpine habitats.			X						
Northern flying squirrel	Coniferous, deciduous, mixed, and riparian forests and woodlands, often most abundant near wetlands or streams.				SGCN NSS4					
Northern long-eared bat (Northern myotis)	Forested regions, conifer and deciduous woodlands. Roosts in crevices and cavities of trees, under loose bark, and occasionally in buildings.	P			SGCN NSS3					
Northern river otter	Permanent riverine, aquatic, and riparian areas. Dens in hollow logs, beaver lodges, burrows dug by other animals, log or rock piles, or dense thickets near water.			X	SGCN NSSU					
Olive-backed pocket mouse	Variety of arid and semiarid upland habitats, primarily sparsely vegetated grasslands and sagebrush-grasslands.				SGCN NSS4					

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Pallid bat	Low desert shrublands, juniper woodlands, and grasslands, and occasionally cottonwood-riparian zones. Roosts in rock crevices, buildings, rock piles, tree cavities, shallow caves, and abandoned mines.				SGCN NSS3					
Preble's shrew	The habitat needs are poorly known. Collected in arid and semiarid sagebrush-grasslands and openings on subalpine coniferous forests dominated by sagebrush. Also known to occur near creeks and bogs bordered by willow or riparian shrub, in wet areas in open conifer stands, and areas covered by marsh grasses.				SGCN NSS3					
Silky pocket mouse	Variety of arid, and sometimes barren, habitats. Prefers thin low grasses and a minimum of bare soil.				SGCN NSS3					
Spotted bat	Prominent rock features in extreme, low desert habitats to high elevation forests.		X	X	SGCN NSS3					

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Swift fox	Grasslands, plains, and foothills in shortgrass prairies and deserts.		X	X	SGCN NSS4					P
Townsend's big-eared bat	Mines, caves, and structures in woodlands and forests to elevations above 9,500 feet.		X	X	SGCN NSS2					S
Vagrant shrew	Riparian shrub, moist meadow grasslands, bogs, and riparian or marsh habitats with moist soil within a variety of habitat types from sagebrush-grasslands and mixed shrubland to conifer forest.				SGCN NSS4					
Water vole	Moist subalpine and alpine meadows of willows, grasses, and forbs atop deep soils.			X	SGCN NSS3					
Western small-footed myotis	Arid, rocky areas within a variety of habitats. Roosts in crevices, overhangs, cliffs, under rocks, caves, buildings, bridges, or under loose bark and/or abandoned mines.				SGCN NSS4					
Reptiles and Amphibians										
Columbia spotted frog	Sub-alpine forests grasslands and sagebrush habitats at elevations from 1,700 feet to 6,400 feet.		X	X	SGCN NSS3					

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Eastern yellow-bellied racer	Scarp woodlands of the plains and foothill zones, and woodland communities, usually close to streams or rocky outcrops with cover nearby.									S
Great plains toad	Grasslands, sand hills and agricultural areas below 6,000 feet in elevation.				SGCN NSSU					
Greater short-horned lizard	Grassland and sagebrush habitats.				SGCN NSS4					S
Northern leopard frog	Permanent ponds, swamps, marshes, and slow-moving streams throughout forest, open, and urban areas. Water bodies with abundant aquatic vegetation.		X	X	SGCN NSSU4					
Pale milksnake	Grasslands, sandhills, and scarp woodlands below 6,000 feet in elevation.				SGCN NSS3					
Plains gartersnake	Residential areas, dry grasslands, and sandhills near small streams, sloughs, marshes, and ponds.				SGCN NSSU					
Plains hog-nosed snake	Grasslands and sandhills. Burrows in loose soils.				SGCN NSSU					
Plains spadefoot	Grasslands and sagebrush communities in the plains zone below 6,000 feet in elevation.				SGCN NSSU					

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Western painted turtle	Swampy habitats, small lakes, ponds, and muddy streams below 6,000 feet in elevation in the plains zone.				SGCN NSS4					
Western spiny softshell turtle	Permanent lakes, ponds, and large streams below 6,000 feet in elevation in the plains.				SGCN NSS4					

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Wood frog	Beaver ponds, slowly moving streams, small lakes, wet meadows and willow thickets in the montane zone, usually around 9,000 feet in elevation.			X	SGCN NSS2					

Source: WGFD 2010b; BLM 2010d; Keinath et al. 2003; BLM 2003c

[1] Occurrence in the planning area is vague or unsubstantiated, according to WYNDD.

Note: Canada lynx is listed as Threatened under the ESA. Although WYNDD considers the Canada lynx a species of concern in Johnson and Sheridan Counties, the USFWS has not designated critical habitat within the planning area, and impacts to this species are therefore not considered in management decisions.

BLM Bureau of Land Management
C Candidate
E Endangered
ESA Endangered Species Act
H High
MH Moderately High
NAWMP North American Waterfowl Management Plan
NSS1 Native Species Status 1
NSS2 Native Species Status 2
NSS3 Native Species Status 3
NSS4 Native Species Status 4
NSSU Native Species Status Unknown
P Proposed
PIF Partners in Flight
SGCN Species of Greatest Conservation Need
T Threatened
TNC The Nature Conservancy
USFS United States Forest Service
USFWS United States Fish and Wildlife Service
WGFD Wyoming Game and Fish Department
WYNDD Wyoming Natural Diversity Database

K.2. Raptor Management

Protections for Raptors

Raptors, or birds of prey, and the majority of other birds in the United States are protected by the Migratory Bird Treaty Act (MBTA), 16 United States Code (U.S.C.) 703. A complete list of migratory bird species can be found in the Code of Federal Regulations (CFR) at 50 CFR 10.13. Eagles are also protected by the Bald and Golden Eagle Protection Act, 16 U.S.C. 668 (Eagle Act).

The MBTA protects migratory birds, eggs and nests from possession, sale, purchase, barter, transport, import, export, and take. The regulatory definition of take, defined in 50 CFR 10.12, means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to hunt, shoot, wound, kill, trap, capture, or collect a migratory bird. Activities that result in the unpermitted take (e.g., result in death, possession, collection, or wounding) of migratory birds or their eggs are illegal and fully prosecutable under the MBTA. Removal or destruction of active nests (i.e., nests that contain eggs or young), or causing abandonment of an active nest, could constitute a violation of the MBTA, the Eagle Act, or both statutes. Removal of any active migratory bird nest or any structure that contains an active nest (e.g., tree) where such removal results in take is prohibited. Therefore, if nesting migratory birds are present on or near a project area, project timing is an important consideration during project planning. As discussed below, the Eagle Act provides additional protections for bald and golden eagles and their nests. For additional information concerning nests and protections under the MBTA, please see the U.S. Fish and Wildlife Service's (USFWS) Migratory Bird Permit Memorandum, MBMP-2.

The USFWS Wyoming Ecological Services Field Office works to raise public awareness about the possible occurrence of birds in proposed project areas and the risk of violating the MBTA, while also providing guidance to minimize the likelihood that take will occur. They encourage you to coordinate with their office before conducting actions that could lead to the take of a migratory bird, their young, eggs, or active nests (e.g., construction or other activity in the vicinity of a nest that could result in a take). If nest manipulation is proposed for a project in Wyoming, the project proponent should also contact the USFWS's Migratory Bird Office in Denver at 303-236-8171 to see if a permit can be issued. Permits generally are not issued for an active nest of any migratory bird species, unless removal of the nest is necessary for human health and safety. If a permit cannot be issued, the project may need to be modified to ensure take of migratory birds, their young or eggs will not occur.

For infrastructure (or facilities) that have potential to cause direct avian mortality (e.g., wind turbines, guyed towers, airports, wastewater disposal facilities, transmission lines), the USFWS recommends locating structures away from high avian-use areas such as those used for nesting, foraging, roosting or migrating, and the travel zones between high-use areas. If the wildlife survey data available for the proposed project area and vicinity do not provide the detail needed to identify normal bird habitat use and movements, they recommend collecting that information prior to determining locations for any infrastructure that may create an increased potential for avian mortalities. The USFWS also recommends contacting the USFWS Wyoming Ecological Services Office for project-specific recommendations.

Additional Protections for Eagles

The Eagle Act protections include provisions not included in the MBTA, such as the protection of unoccupied nests and a prohibition on disturbing eagles. Specifically, the Eagle Act prohibits knowingly taking, or taking with wanton disregard for the consequences of an activity, any bald

or golden eagle or their body parts, nests, chicks or eggs, which includes collection, possession, molestation, disturbance, or killing. The term "disturb" is defined as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (50 CFR 22.3 and see also 72 Federal Register [FR] 31132).

The Eagle Act includes limited exceptions to its prohibitions through a permitting process. The USFWS has issued regulations concerning the permit procedures for exceptions to the Eagle Act's prohibitions (74 FR 46836), including permits to take golden eagle nests which interfere with resource development or recovery operations (50 CFR 22.25). The regulations identify the conditions under which a permit may be issued (i.e., status of eagles, need for action), application requirements, and other issues (e.g., mitigation, monitoring) necessary in order for a permit to be issued.

For additional recommendations specific to Bald Eagles please see the USFWS Bald Eagle information web page (http://www.fws.gov/wyominges/Pages/Species/Species_SpeciesConcern/BaldEagle.html).

Recommended Steps for Addressing Raptors in Project Planning

Using the following steps in early project planning proponents can more easily minimize impacts to raptors, streamline planning and permitting processes, and incorporate measures into an adaptive management program:

1. Coordinate with appropriate USFWS offices, Wyoming Game and Fish Department (WGFD), Tribal governments, and land-management agencies at the earliest stage of project planning.
2. Identify species and distribution of raptors occurring within the project area by searching existing data sources (e.g., WGFD, federal land-management agencies) and by conducting onsite surveys.
3. Plan and schedule short-term and long-term project disturbances and human-related activities to avoid raptor nesting and roosting areas, particularly during crucial breeding and wintering periods
4. Determine location and distribution of important raptor habitat, nests, roost sites, migration zones and, if feasible, available prey base in the project impact area.
5. Document the type, extent, timing, and duration of raptor activity in important use areas to establish a baseline of raptor activity.
6. Ascertain the type, extent, timing, and duration of development or human activities proposed to occur, and the extent to which this differs from baseline conditions.
7. Consider cumulative effects to raptors from proposed projects when added to past, present, and reasonably foreseeable actions. Ensure that project mitigation adequately addresses cumulative effects to raptors.
8. Minimize loss of raptor habitats and avoid long-term habitat degradation. Mitigate for unavoidable losses of high-valued raptor habitats, including (but not limited to) nesting, roosting, migration, and foraging areas.
9. Monitor and document the status of raptor populations and, if feasible, their prey base post project completion, and evaluate the success of mitigation efforts.
10. Document meaningful data and evaluations in a format that can be readily shared and incorporated into wildlife databases (contact the USFWS Wyoming Ecological Services Office for details).

Protection of nesting, wintering (including communal roost sites), and foraging activities is considered essential to conserving raptors. In order to promote the conservation of migratory bird populations and their habitats, federal agencies should implement those strategies directed by Executive Order (EO) 13186, "Responsibilities of Federal Agencies To Protect Migratory Birds" (66 FR 3853).

Recommended Seasonal and Spatial Buffers to Protect Nesting Raptors

Because many raptors are particularly sensitive to disturbance (that may result in take) during the breeding season, the USFWS recommends implementing spatial and seasonal buffer zones to protect individual nest sites/territories (Table K.5, "Wyoming Ecological Services Field Office's Recommended Spatial and Seasonal Buffers for Breeding Raptors" (p. 2208)). The buffers serve to minimize visual and auditory impacts associated with human activities near nest sites. Ideally, buffers would be large enough to protect existing nest trees and provide for alternative or replacement nest trees. The size and shape of effective buffers vary depending on the topography and other ecological characteristics surrounding the nest site. In open areas where there is little or no forested or topographical separation, distance alone must serve as the buffer. Adequate nesting buffers will help ensure activities do not take breeding birds, their young or eggs. For optimal conservation benefit, the USFWS recommends that no temporary or permanent surface occupancy occur within species-specific spatial buffer zones. For some activities with very substantial auditory impacts (e.g., seismic exploration and blasting) or visual impacts (e.g., tall drilling rig), a larger buffer than listed in Table K.5, "Wyoming Ecological Services Field Office's Recommended Spatial and Seasonal Buffers for Breeding Raptors" (p. 2208) may be necessary, please contact the USFWS Wyoming Ecological Services Office for project specific recommendations on adequate buffers.

As discussed above, for infrastructure that may create an increased potential for raptor mortalities, the spatial buffers listed in Table K.5, "Wyoming Ecological Services Field Office's Recommended Spatial and Seasonal Buffers for Breeding Raptors" (p. 2208) may not be sufficient to reduce the incidence of raptor mortalities (for example, if a wind turbine is placed outside a nest disturbance buffer, but inadvertently still within areas of normal daily or migratory bird movements); therefore, please contact the USFWS Wyoming Ecological Services Office for project specific recommendations on adequate buffers.

Buffer recommendations may be modified on a site-specific or project-specific basis based on field observations and local conditions. The sensitivity of raptors to disturbance may be dependent on local topography, density of vegetation, and intensity of activities. Additionally, individual birds may be habituated to varying levels of disturbance and human-induced impacts. Modification of protective buffer recommendations may be considered where biologically supported and developed in coordination with the USFWS Wyoming Ecological Services Field Office.

Because raptor nests are not always identified to species (e.g., preliminary aerial surveys in winter), nests of unknown raptor species will be considered as golden eagle nests when located in trees or similar vertical structure and as ferruginous hawk nests when located on the ground (including creek bank, rock outcrop, cliff, or erosional feature). Ferruginous hawks receive the most conservative buffers of ground-nesting species while golden eagles receive the most conservative buffers of those species which typically nest in trees. The Buffalo Field Office database (queried September 12, 2013) contains 1,403 nests identified as ferruginous hawk of which 1,278 or 91 percent are ground nests; of the remaining 9 percent of ferruginous hawk nests many did not have the nest substrate recorded. Once the raptor species is confirmed, we then make species-specific and site-specific recommendations on seasonal and spatial buffers

(Table K.5, "Wyoming Ecological Services Field Office's Recommended Spatial and Seasonal Buffers for Breeding Raptors" (p. 2208)).

Activities should not occur within the spatial/seasonal buffer of any nest (occupied or unoccupied) when raptors are in the process of courtship and nest site selection. Long-term land-use activities and human-use activities should not occur within the species-specific spatial buffer of occupied nests. Short-term land use and human-use activities proposed to occur within the spatial buffer of an occupied nest should only proceed during the seasonal buffer after coordination with the USFWS, state, and land-management agency biologists. If, after coordination, it is determined that due to human or environmental safety or otherwise unavoidable factors, activities require temporary incursions within the spatial and seasonal buffers, those activities should be planned to minimize impacts and monitored to determine whether impacts to birds occurred. Mitigation for habitat loss or degradation should be identified and planned in coordination with applicable agencies.

Please contact the USFWS Wyoming Ecological Services Field Office if you have any questions regarding the status of the bald eagle, permit requirements, or if you require technical assistance regarding the MBTA, Eagle Act, or the above recommendations. The recommended spatial and seasonal buffers do not supersede provisions of the MBTA, Eagle Act, (Migratory Bird Permit Memorandum (MBMP-2), and Endangered Species Act (ESA) (16 U.S.C 1531 et seq.). Assessing legal compliance with the MBTA or the Eagle Act and the implementing regulations is ultimately the authority and responsibility of the USFWS law enforcement personnel. The USFWS recommendations also do not supersede federal, state, local, or tribal regulations or permit conditions that may be more restrictive.

Table K.5. Wyoming Ecological Services Field Office's Recommended Spatial and Seasonal Buffers for Breeding Raptors

Common Name	Spatial buffer (miles)	Seasonal buffer
Raptors of Conservation Concern (see below for more information)		
Golden Eagle	0.50	January 15 - July 31
Ferruginous Hawk	1.00	March 15 - July 31
Swainson's Hawk	0.25	April 1 - August 31
Bald Eagle	see Bald Eagle information web page[1]	
Prairie Falcon	0.50	March 1 - August 15
Peregrine Falcon	0.50	March 1 - August 15
Short-eared Owl	0.25	March 15 - August 1
Burrowing Owl	0.25	April 1 - September 15
Northern Goshawk	0.50	April 1 - August 15
Additional Wyoming Raptors		
Osprey	0.25	April 1 - August 31
Cooper's Hawk	0.25	March 15 - August 31
Sharp-shinned Hawk	0.25	March 15 - August 31
Red-tailed Hawk	0.25	February 1 - August 15
Rough-legged Hawk (winter resident only)	----	----
Northern Harrier	0.25	April 1 - August 15
Merlin	0.50	April 1 - August 15
American Kestrel	0.125	April 1 - August 15
Common Barn Owl	0.125	February 1 - September 15
Northern Saw-whet Owl	0.25	March 1 - August 31
Boreal Owl	0.25	February 1 - July 31

Common Name	Spatial buffer (miles)	Seasonal buffer
Long-eared Owl	0.25	February 1 - August 15
Great Horned Owl	0.125	December 1 - September 30
Northern Pygmy-Owl	0.25	April 1 - August 1
Eastern Screech-owl	0.125	March 1 - August 15
Western Screech-owl	0.125	March 1 - August 15
Great Gray Owl	0.25	March 15 - August 31
[1] http://www.fws.gov/wyominges/Pages/Species/Species_SpeciesConcern/BaldEagle.html		

Raptors of Conservation Concern

The USFWS Birds of Conservation Concern (2008) report identifies "species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing" under the ESA (16 U.S.C. 1531 et seq.). This report is intended to stimulate coordinated and proactive conservation actions among federal, state, and private partners. The Wyoming Partners in Flight Wyoming Bird Conservation Plan identifies priority bird species and habitats, and establishes objectives for bird populations and habitats in Wyoming. This plan also recommends conservation actions to accomplish the population and habitat objectives.

We encourage project planners to develop and implement protective measures for the Birds of Conservation Concern as well as other high-priority species identified in the Wyoming Bird Conservation Plan. For additional information on the Birds of Conservation Concern that occur in Wyoming, please see the USFWS Birds of Conservation Concern web page.

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Appendix L. Lands Identified for Disposal Through Exchange or Sale

The Buffalo Field Office (BFO) Resource Management Plan (RMP) revision project specifically identifies areas available for consideration for disposal by employing the "isolated, difficult or expensive to manage, or needed-for community expansion" disposal criteria in the Federal Land Policy and Management Act (FLPMA). The areas in the table below were identified during the RMP revision process as meeting the FLPMA disposal criteria. Inclusion in this table does not constitute a decision that the land will be disposed. Before taking any disposal action, consideration will be given to each individual tract and will include public involvement.

As stated elsewhere in the RMP, the preferred method of disposal or acquisition of lands is through land exchanges. Proposals for disposal of lands not identified in this table will be considered if they are consistent with the objectives of the approved RMP and may require a land use plan amendment.

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Range 69 West			
T. 45 N., R. 69 W.			
Sec. 3: Lots 11, 18[a]	79.69	Yes	Yes
Sec. 10: Lots 2-4	122.46	Yes	Yes
Sec. 11: Lots 1-4	165.76	Yes	Yes
Sec. 12: Lots 2-8	285.17	Yes	Yes
Sec. 14: Lot 4	41.98	Yes	Yes
Sec. 15: Lot 12	41.37	Yes	Yes
Sec. 22: Lots 1, 2, 5	125.89	Yes	Yes
Sec. 23: Lots 3-6, 10-13	333.05	Yes	Yes
Sec. 25: Lot 6	41.65	Yes	Yes
Sec. 26: Lots 11-14	161.54	Yes	Yes
Sec. 27: Lots 2, 4-6, 9, 10	243.21	Yes	Yes
Sec. 28: Lots 1, 6-9, 14, 15	295.51	Yes	Yes
Sec. 34: Lot 2, 3, 7, 10, 16	199.74	Yes	Yes
Sec. 35: Lots 1-4, 7-10	327.86	Yes	Yes
T. 46 N., R. 69 W.			
Sec. 2: Lots 5-19	617.51	Yes	Yes
Sec. 3: Lot 16	38.44	Yes	Yes
Sec. 34: Lot 1	39.82	Yes	Yes
T. 47 N., R. 69 W.			
Sec. 11: Lot 2	40.82	Yes	Yes
Sec. 20: Lot 1	43.21	Yes	Yes
Sec. 21: Lot 1	40.89	Yes	Yes
T. 48 N., R. 69 W.			
Sec. 6: Lots 10-13, 17-20	309.58	Yes	Yes
Sec. 11: Lots 1, 2	79.64	Yes	Yes
Sec. 18: Lots 6, 7	79.39	Yes	Yes
Sec. 19: Lots 7-9, 15, 16	194.16	Yes	Yes
T. 49 N., R. 69 W.			
Sec. 20: Lot 1	40.53	Yes	Yes
Sec. 22: Lot 5	41.25	Yes	Yes
Sec. 31: Lots 11, 14, 19	123.35	Yes	Yes
T. 50 N., R. 69 W.			

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 5: Lot 6	39.81	Yes	Yes
T. 51 N., R. 69 W.			
Sec. 2: Lots 5, 6, 9, 10, 13	205.18	Yes	Yes
Sec. 22: Lot 12	40.12	Yes	Yes
Sec. 23: Lot 5	40.23	Yes	Yes
T. 52 N., R. 69 W.			
Sec. 15: Lots 9, 10	84.01	Yes	Yes
Sec. 20: Lot 12	39.02	Yes	Yes
Sec. 22: Lots 1, 2, 5, 6	170.40	Yes	Yes
Sec. 27: Lots 1, 2, 4, 5, 11-14	355.16	Yes	Yes
T. 53 N., R. 69 W.			
Sec. 10: Lot 5	39.75	Yes	Yes
Sec. 13: Lot 7	45.25	Yes	Yes
Sec. 15: Lots 9, 16	84.01	Yes	Yes
Sec. 18: Lots 5, 10, 11 14	144.46	Yes	Yes
Sec. 22: Lots 3-6	171.53	Yes	Yes
Sec. 30: Lots 6, 7	77.87	Yes	Yes
T. 56 N., R. 69 W.			
Sec. 1: SWSW	39.92	Yes	Yes
Sec. 12: NWNW	39.93	Yes	Yes
Sec. 13: Lots 2-4, NWNE, W2SW	252.41	Yes	Yes
Sec. 14: Lots 4-6, S2NE	148.72	Yes	Yes
Sec. 15: Lots 1, 3, 4	38.65	Yes	Yes
Sec. 19: S2SE	79.89	Yes	Yes
Sec. 29: W2NW, NWSW	119.80	Yes	Yes
Sec. 30: Lots 6-10, 15-18, 20, NWNE, NESE	434.41	Yes	Yes
Sec. 31: Lots 5, 12, 14	110.46	Yes	Yes
Sec. 32: SWNE	39.95	Yes	Yes
Sec. 35: Lot 6	18.41	Yes	Yes
T. 56 1/2 N., R. 69 W.			
Sec. 35: Lot 1	13.77	No	Yes
T. 57 N., R. 69 W.			
Sec. 17: Lot 4	34.29	Yes	Yes
Sec. 28: Lot 6	23.80	Yes	Yes
T. 58 N., R. 69 W.			
Sec. 30: Lots 9, 10	74.67	Yes	Yes
Range 70 West			
T. 45 N., R. 70 W.			
Sec. 29: Lot 12	41.15	Yes	Yes
Sec. 30: Lot 16	39.48	Yes	Yes
T. 46 N., R. 70 W.			
Sec. 3: Lots 14, 15	82.53	Yes	Yes
Sec. 4: Lots 5, 7-10, 14	244.06	Yes	Yes
Sec. 5: Lots 5, 6, 11-14, 19, 20	322.94	Yes	Yes
Sec. 6: Lots 18, 19, 21	119.16	Yes	Yes
Sec. 8: Lots 1, 8	79.85	Yes	Yes
Sec. 9: Lots 5,7,10, 12	159.41	Yes	Yes
Sec. 10: Lots 1, 5, 11, 12	163.52	Yes	Yes
Sec. 11: Lots 4, 7, 8	120.53	Yes	Yes
Sec. 13: Lot 13	40.09	Yes	Yes
Sec. 14: Lots 10, 15, 16	120.76	Yes	Yes
Sec. 15: Lots 5, 6	81.34	Yes	Yes
Sec. 20: Lots 1, 8, 9	121.67	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 21: Lots 11, 12, 14	121.99	Yes	Yes
Sec. 22: Lots 5, 12	80.87	Yes	Yes
Sec. 23: Lots 2, 5, 8, 11-13	242.73	Yes	Yes
Sec. 24: Lots 4, 5	80.28	Yes	Yes
Sec. 26: Lot 12	40.33	Yes	Yes
Sec. 27: Lot 5	41.13	Yes	Yes
Sec. 31: Lots 6, 18	80.07	Yes	Yes
Sec. 32: Lots 1, 2, 11	127.02	Yes	Yes
Sec. 34: Lots 1, 2	80.73	Yes	Yes
T. 47 N., R. 70 W.,			
Sec. 21: Lots 1, 8	79.75	Yes	Yes
Sec. 22: Lots 1, 3-6	198.53	Yes	Yes
Sec. 33: Lot 14	40.44	Yes	Yes
T. 48 N., R. 70 W.,			
Sec. 1: Lots 7-10	152.59	Yes	Yes
Sec. 2: Lot 5	39.40	Yes	Yes
Sec. 3: Lots 13, 19, 20	113.83	Yes	Yes
Sec. 12: Lots 1-3, 6	160.33	Yes	Yes
Sec. 13: Lots 1, 2, 7-9	204.62	Yes	Yes
Sec. 22: Lot 3	40.27	No	Yes
Sec. 24: Lots 1, 8, 9, 15	161.41	Yes	Yes
Sec. 25: Lots 1, 2, 7, 8	164.65	Yes	Yes
Sec. 29: Lot 16	40.86	Yes	Yes
T. 49 N., R. 70 W.,			
Sec. 27: Lot 3	40.09	Yes	Yes
Sec. 33: Lots 1, 8, 13	122.12	Yes	Yes
T. 50 N., R. 70 W.,			
Sec. 4: Lot 6	35.23	Yes	Yes
Sec. 15: Lot 4	39.90	Yes	Yes
Sec. 19: Lot 15	40.69	Yes	Yes
Sec. 30: Lot 15	39.39	No	Yes
Sec. 34: Lots 3, 4	82.19	Yes	Yes
T. 51 N., R. 70 W.,			
Sec. 4: Lot 7	40.35	Yes	Yes
Sec. 7: Lot 10	40.40	Yes	Yes
Sec. 10: Lot 3	41.33	Yes	Yes
Sec. 18: Lots 5, 11	83.61	Yes	Yes
T. 52 N., R. 70 W.,			
Sec. 4: Lot 11	39.97	Yes	Yes
Sec. 28: Lot 1	40.24	Yes	Yes
Sec. 32: Lots 1, 4	83.51	Yes	Yes
Sec. 33: Lot 3	39.59	Yes	Yes
Sec. 35: Lot 7	41.61	Yes	Yes
T. 53 N., R. 70 W.,			
Sec. 2: Lot 9	39.91	Yes	Yes
Sec. 15: Lots 14, 15	81.23	Yes	Yes
Sec. 22: Lot 2	41.57	Yes	Yes
Sec. 23: Lots 4, 5	81.69	Yes	Yes
T. 56 N., R. 70 W.,			
Sec. 6: Lots 25, 29, 30	119.85	Yes	Yes
Sec. 7: Lots 5-10, 13, 14	201.61	Yes	Yes
Sec. 9: NW	159.62	Yes	Yes
Sec. 18: Lot 10	15.49	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 19: Lots 5-11	174.17	Yes	Yes
Sec. 20: SWSE	39.95	Yes	Yes
Sec. 24: Lots 4, 7	40.55	Yes	Yes
Sec. 25: Lots 2-5, 7, 8, 11, 12	319.92	Yes	Yes
Sec. 26: N2NE, NWSW	119.87	Yes	Yes
Sec. 29: N2NE	79.89	Yes	Yes
Sec. 30: Lots 5-10, NWSE	252.40	Yes	Yes
Sec. 33: S2NW	79.97	Yes	Yes
Sec. 35: Lots 1, 2	80.84	Yes	Yes
T. 57 N., R. 70 W.,			
Sec. 6: Lot 12	31.49	Yes	Yes
Sec. 19: SESE	39.95	Yes	Yes
Sec. 20: S2SW	80.10	Yes	Yes
Sec. 22: SESE	39.94	Yes	Yes
Sec. 25: SWNE, S2SW, SE	279.96	Yes	Yes
Sec. 26: NESW	39.94	Yes	Yes
Sec. 29: NENW, N2SW, NWSE	160.04	Yes	Yes
Sec. 30: Lots 5, 6, SWNE, SENW, NESW, NWSE	238.93	Yes	Yes
Sec. 31: Lot 7, NWNE	53.22	Yes	Yes
Sec. 32: N2NW	79.94	Yes	Yes
Sec. 33: S2NE, NENW	119.99	Yes	Yes
Sec. 36: Lots 1, 2	34.70	No	Yes
Sec. 36: N2NE, NENW	119.99	Yes	Yes
T. 58 N., R. 70 W.,			
Sec. 25: Lot 6	27.76	Yes	Yes
Sec. 27: SWSE	40.01	Yes	Yes
Sec. 31: Lots 6, 12	22.12	Yes	Yes
Sec. 32: Lot 4	36.95	Yes	Yes
Sec. 34: S2NE, NENW	119.99	Yes	Yes
Range 71 West			
T. 44 N., R. 71 W.,			
Sec. 30: Lots 17, 18	76.31	Yes	Yes
T. 45 N., R. 71 W.,			
Sec. 3: Lot 14	41.19	Yes	Yes
Sec. 4: Lots 5, 12	84.99	Yes	Yes
T. 46 N., R. 71 W.,			
Sec. 1: Lot 11	40.28	Yes	Yes
Sec. 2: Lot 13	40.60	Yes	Yes
Sec. 4: Lots 19, 20	81.30	Yes	Yes
Sec. 9: Lots 1, 2, 4-7	245.18	Yes	Yes
Sec. 10: Lots 3-5, 8- 10	243.59	Yes	Yes
Sec. 11: Lot 4	40.61	Yes	Yes
Sec. 15: Lots 1, 2	81.21	Yes	Yes
T. 47 N., R. 71 W.,			
Sec. 29: Lot 7	40.70	Yes	Yes
T. 49 N., R. 71 W.,			
Sec. 8: Lot 9	40.79	Yes	Yes
Sec. 9: Lots 8, 10	81.13	Yes	Yes
T. 50 N., R. 71 W.,			
Sec. 4: Lot 5	38.70	Yes	Yes
T. 51 N., R. 71 W.,			
Sec. 35: Lot 7	40.50	Yes	Yes
T. 52 N., R. 71 W.,			

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 25: Lot 5	39.64	Yes	Yes
Sec. 30: Lots 5, 12	75.11	Yes	Yes
T. 53 N., R. 71 W.,			
Sec. 15: Lots 2, 7	78.98	Yes	Yes
Sec. 21: Lot 1	39.39	Yes	Yes
Sec. 28: Lot 1, W2NW	124.25	Yes	Yes
Sec. 29: Lots 1, 8, 9	119.05	Yes	Yes
T. 54 N., R. 71 W.,			
Sec. 10; Lot 4	40.74	Yes	Yes
Sec. 17: Lots 9, 10	80.83	Yes	Yes
T. 55 N., R. 71 W.,			
Sec. 1: Lot 7	41.13	Yes	Yes
Sec. 2: Lots 10, 11, 14, 15, 19, 20	248.02	Yes	Yes
Sec. 8: Lot 1	37.70	Yes	Yes
Sec. 24: Lots 3, 5, 6, 9	147.24	Yes	Yes
Sec. 25: Lot 11	39.76	Yes	Yes
Sec. 28: Lot 3	42.34	Yes	Yes
T. 56 N., R. 71 W.,			
Sec. 6: Lot 10	38.62	Yes	Yes
Sec. 12: E2NE	79.87	Yes	Yes
Sec. 13: SESW	39.95	Yes	Yes
Sec. 24: Lot 1, E2W2, W2SE	276.75	Yes	Yes
Sec. 25: Lot 1, W2NE, E2NW	162.14	Yes	Yes
Sec. 29: NWNW	40.00	Yes	Yes
T. 57 N., R. 71 W.			
Sec. 1: Lot 5	11.64	Yes	Yes
Sec. 1: Lots 6, 9	2.17	No	Yes
Sec. 3: Lot 8	40.03	Yes	Yes
Sec. 4: Lot 8, SWNW	79.97	Yes	Yes
Sec. 5: ALL	640.78	Yes	Yes
Sec. 8: N2NW	80.05	Yes	Yes
Sec. 10: SWSE	39.95	Yes	Yes
Sec. 13: Lot 3	43.52	Yes	Yes
Sec. 27: E2SE	79.90	Yes	Yes
Sec. 31: SESE	39.97	Yes	Yes
Sec. 34: SENW	39.96	Yes	Yes
Sec. 35: Track 46D	39.95	Yes	Yes
Range 72 West			
T. 44 N., R. 72 W.,			
Sec. 7: Lots 13, 14, 19, 20	163.72	Yes	Yes
Sec. 18: Lots 5, 11, 12	122.29	Yes	Yes
Sec. 19: Lot 5	40.14	Yes	Yes
T. 45 N., R. 72 W.,			
Sec. 15: Lot 10	40.95	Yes	Yes
Sec. 18: Lot 6	43.61	Yes	Yes
Sec. 23: Lot 12	40.97	Yes	Yes
T. 46 N., R. 72 W.,			
Sec. 14: Lot 10	40.36	Yes	Yes
Sec. 25: Lots 5, 6, 7	119.89	Yes	Yes
Sec. 26: Lot 6	37.82	Yes	Yes
Sec. 31: Lot 20	42.86	Yes	Yes
T. 47 N., R. 72 W.,			
Sec. 2: Lots 8, 9	81.23	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 3: Lot 10	39.91	Yes	Yes
Sec. 7: Lots 16, 17	85.15	Yes	Yes
T. 48 N., R. 72 W.,			
Sec. 14: Lot 13	41.02	Yes	Yes
Sec. 15: Lot 13	40.34	Yes	Yes
Sec. 22: Lot 6	40.62	Yes	Yes
T. 49 N., R. 72 W.,			
Sec. 12: Lot 11	39.99	Yes	Yes
T. 50 N., R. 72 W.,			
Sec. 1: Lot 5	39.38	Yes	Yes
Sec. 7: Lots 13, 20	83.09	Yes	Yes
T. 51 N., R. 72 W.,			
Sec. 11: Lot 4	35.91	Yes	Yes
T. 53 N., R. 72 W.,			
Sec. 6: Lot 8	37.83	Yes	Yes
Sec. 7: Lots 5-7	111.18	Yes	Yes
T. 54 N., R. 72 W.,			
Sec. 3: Lots 6-11, 14-19	474.25	Yes	Yes
Sec. 8: Lots 1-8, 10-16	609.34	Yes	Yes
Sec. 11: Lots 9-13	226.36	Yes	Yes
T. 55 N., R. 72 W.,			
Sec. 6: Lots 15-17	117.75	Yes	Yes
Sec. 7: Lots 11, 12, 14, 19	159.91	Yes	Yes
Sec. 8: Lots 3, 4	79.36	Yes	Yes
Sec. 9: Lots 8-11	160.91	Yes	Yes
Sec. 10: Lot 8	39.62	Yes	Yes
Sec. 11: Lot 4	39.69	Yes	Yes
Sec. 12: Lots 2, 7, 10, 15	157.01	Yes	Yes
Sec. 17: Lots 1-3	120.30	Yes	Yes
Sec. 18: Lots 9, 10	77.33	Yes	Yes
Sec. 19: Lot 10	40.69	Yes	Yes
Sec. 21: Lots 2, 13	78.26	Yes	Yes
Sec. 22: Lot 3	38.56	Yes	Yes
Sec. 28: Lot 4	38.67	Yes	Yes
Sec. 29: Lots 5-9	198.21	Yes	Yes
Sec. 30: Lots 9, 13, 15, 16	156.33	Yes	Yes
Sec. 31: Lots 12-14	119.92	Yes	Yes
Sec. 33: Lots 3-5, 7, 8	197.84	Yes	Yes
Sec. 34: Lots 6-8	119.38	Yes	Yes
T. 56 N., R. 72 W.,			
Sec. 3: Lots 17, 19	77.85	No	Yes
Sec. 5: Lot 17	39.92	Yes	Yes
Sec. 6: Lots 16, 17, 22, 23	159.80	Yes	Yes
Sec. 8: Lot 1	49.81	Yes	Yes
Sec. 19; Lots 8, 11-14	114.62	Yes	Yes
Sec. 23: SESE	40.00	Yes	Yes
Sec. 24: N2SE, SESE	119.89	Yes	Yes
Sec. 25: NWNW, SENW	79.94	Yes	Yes
T. 57 N., R. 72 W.,			
Sec. 7: Lots 6, 7	74.53	Yes	Yes
Sec. 15: SESE	39.91	Yes	Yes
Sec. 16: Lot 5	11.42	Yes	Yes
Sec. 18: Lot 8, E2SE	38.84	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 19: N2NE, SENE	119.87	Yes	Yes
Sec. 20: N2NW, SENW	119.89	Yes	Yes
Sec. 21: Lot 3	4.26	Yes	Yes
Sec. 22: Lot 3	0.57	Yes	Yes
Sec. 26: NWSW	39.93	Yes	Yes
Sec. 29: Lot 2, SWSW, E2SW	159.34	Yes	Yes
Sec. 30: Lot 10, SESE	79.25	Yes	Yes
Sec. 31: Lots 5-7	4.17	Yes	Yes
Sec. 32: Lot 1, NENW	43.07	Yes	Yes
Sec. 33: Lots 3, 4	48.91	Yes	Yes
Sec. 34: Lot 2, E2SW	106.58	Yes	Yes
T. 58 N., R. 72 W.,			
Sec. 19: Lot 11	37.29	Yes	Yes
Sec. 30: Lot 5	35.62	Yes	Yes
Range 73 West			
T. 44 N., R. 73 W.,			
Sec. 6: Lot 17	40.15	Yes	Yes
Sec. 14: Lots 1-3, 6-13, 15	477.17	Yes	Yes
T. 45 N., R. 73 W.,			
Sec. 2: Lot 18	40.20	Yes	Yes
Sec. 33: Lot 15	39.64	Yes	Yes
T. 51 N., R. 73 W.,			
Sec. 3: Lots 9-11	119.44	Yes	Yes
Sec. 4: Lots 11, 12, 15	119.86	Yes	Yes
Sec. 5: Lots 11-14, 19	198.82	Yes	Yes
Sec. 6: Lot 16	40.05	Yes	Yes
Sec. 9: Lot 7	40.27	Yes	Yes
Sec. 30: Lot 13	39.94	Yes	Yes
T. 52 N., R. 73 W.,			
Sec. 29: Lot 14	40.02	Yes	Yes
Sec. 33: Lots 13-16	156.13	Yes	Yes
T. 53 N., R. 73 W.,			
Sec. 3: Lot 19	42.07	Yes	Yes
Sec. 9: Lots 9, 16	80.42	Yes	Yes
Sec. 12: Lot 2	41.90	Yes	Yes
Sec. 13: Lots 2-4	121.91	Yes	Yes
Sec. 14: Lot 3	39.34	Yes	Yes
Sec. 15: Lots 2, 3	81.08	Yes	Yes
T. 54 N., R. 73 W.,			
Sec. 2: Lot 10	39.30	Yes	Yes
Sec. 10: Lots 3, 4	80.10	Yes	Yes
Sec. 13: Lots 1-14	564.50	Yes	Yes
Sec. 15: Lot 4	40.11	Yes	Yes
Sec. 17: Lot 5	38.99	Yes	Yes
Sec. 24: Lots 3, 4, 13, 14	162.24	Yes	Yes
Sec. 33: Lots 2-4, 7, 9, 10	243.38	Yes	Yes
Sec. 35: Lots 9, 10, 15, 16	162.26	Yes	Yes
T. 55 N., R. 73 W.,			
Sec. 1: Lot 5	40.27	Yes	Yes
Sec. 2: Lots 5-7, Tracts 42A, 42B, 42C, 42D	161.69	Yes	Yes
Sec. 11: Tract 42D	11.74	Yes	Yes
Sec. 12: Lots 3, 7	68.88	Yes	Yes
Sec. 13: Lot 6	44.90	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 14: Lot 1	27.42	Yes	Yes
Sec. 23: Lot 2	12.84	Yes	Yes
T. 56 N., R. 73 W.,			
Sec. 5: Lots 5	36.37	Yes	Yes
Sec. 8: Lots 1, 15	81.29	Yes	Yes
Sec. 12: Lots 1	41.29	Yes	Yes
Sec. 15: Lots 12, 13	80.57	Yes	Yes
Sec. 17: Lots 3, 6, 7	122.50	Yes	Yes
Sec. 21: Lots 2, 7, 10	121.91	Yes	Yes
Sec. 22: Lots 3, 6	81.42	Yes	Yes
Sec. 27: Lot 16	40.68	Yes	Yes
Sec. 35: Lot 1, NWNW, S2NW, SESW	166.94	Yes	Yes
T. 57 N., R. 73 W.,			
Sec. 3: Lot 8, SWNW	78.60	Yes	Yes
Sec. 4: SENE	39.97	Yes	Yes
Sec. 7: Lot 8	39.25	Yes	Yes
Sec. 9: E2SW	79.90	Yes	Yes
Sec. 18: Lot 5	39.31	Yes	Yes
Sec. 22: NW, N2SW	239.79	Yes	Yes
Sec. 25: SENW	39.95	Yes	Yes
Sec. 28: NESW	39.92	Yes	Yes
Sec. 32: Lot 12	13.41	Yes	Yes
T. 58 N., R. 73 W.,			
Sec. 21: Lot 6, NWSW, S2SE	164.28	Yes	Yes
Sec. 22: Lot 3	44.42	Yes	Yes
Sec. 27: Lot 1, NWNE, W2NW	56.03	Yes	Yes
Sec. 28: NWNW	40.03	Yes	Yes
Sec. 31: Lots 5, 6	71.11	Yes	Yes
Sec. 32: NWNE, N2NW	119.82	Yes	Yes
Range 74 West			
T. 42 N., R. 74 W.,			
Sec. 22: Lot 10	40.05	Yes	Yes
T. 46 N., R. 74 W.,			
Sec. 10: Lots 2, 7, 10	122.06	Yes	Yes
Sec. 11: Lot 16	40.53	Yes	Yes
T. 47 N., R. 74 W.,			
Sec. 26: Lot 9	40.17	Yes	Yes
T. 48 N., R. 74 W.,			
Sec. 3: Lots 16, 17	77.17	Yes	Yes
Sec. 4: Lots 13-15, 18-20	230.52	Yes	Yes
Sec. 9: Lots 1-3, 6-8	228.99	Yes	Yes
Sec. 10: Lots 2, 4, 5	116.08	Yes	Yes
T. 50 N., R. 74 W.,			
Sec. 10: Lots 4, 5, 11, 12, 14	203.72	Yes	Yes
Sec. 15: Lot 3	40.76	Yes	Yes
Sec. 20: Lot 8	40.35	Yes	Yes
Sec. 21: Lot 13	40.23	Yes	Yes
Sec. 22: Lot 8	40.74	Yes	Yes
Sec. 23: Lots 3, 14	81.73	Yes	Yes
Sec. 27: Lot 4	40.27	Yes	Yes
T. 51 N., R. 74 W.,			
Sec. 3: Lots 7, 8, 10	108.98	Yes	Yes
Sec. 4: Lot 20	37.17	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 5: Lot 17	36.78	Yes	Yes
Sec. 7: Lots 8, 9, 11, 12	142.45	Yes	Yes
Sec. 9: Lot 3	41.06	Yes	Yes
Sec. 18: Lots 6, 7	77.71	Yes	Yes
Sec. 27: Lots 1, 2	80.12	Yes	Yes
Sec. 28: Lots 3, 7	81.99	Yes	Yes
Sec. 34: Lot 8	43.01	Yes	Yes
T. 52 N., R 74 W.,			
Sec. 4: Lots 16, 17	81.94	Yes	Yes
Sec. 18: Lots 17, 18	79.63	Yes	Yes
T. 53 N., R. 74 W.,			
Sec. 6: Lots 15	40.17	Yes	Yes
Sec. 7: Lot 8	36.14	Yes	Yes
Sec. 8: Lot 15, SENW	79.73	Yes	Yes
Sec. 9: Lot 14	39.59	Yes	Yes
Sec. 10: Lots 3, 4	80.17	Yes	Yes
Sec. 11: Lots 1, 2, 7-9	239.02	Yes	Yes
Sec. 12: Lots 1, 7-10	199.14	Yes	Yes
Sec. 13: Lots 2-4	121.53	Yes	Yes
Sec. 15: Lots 5, 6, 11-13	202.08	Yes	Yes
Sec. 17: Lots 1, 8	79.33	Yes	Yes
Sec. 22: Lot 1	40.25	Yes	Yes
Sec. 26: Lots 1, 2	80.80	Yes	Yes
T. 54 N., R. 74 W.,			
Sec. 4: Lot 7	41.11	Yes	Yes
Sec. 5: Lot 20	39.56	Yes	Yes
Sec. 9: Lot 16	40.17	Yes	Yes
Sec. 15: Lots 15, 16	80.69	Yes	Yes
Sec. 17: Lot 10	40.32	Yes	Yes
Sec. 19: Lot 5	39.56	Yes	Yes
Sec. 20: Lots 1-4	157.89	Yes	Yes
Sec. 21: Lots 11-14	158.91	Yes	Yes
T. 55 N., R. 74 W.,			
Sec. 4: Lot 5	59.84	Yes	Yes
Sec. 5: Lots 6, 11, NWSW	79.77	Yes	Yes
Sec. 16: Lot 5	4.56	Yes	Yes
Sec. 20: NWSE	40.00	Yes	Yes
Sec. 21: Lot 1	35.40	Yes	Yes
Sec. 27: NESW	40.00	Yes	Yes
T. 56 N., R. 74 W.,			
Sec. 3: Lot 19	41.26	Yes	Yes
Sec. 6: Lots 14-17, 22, 23	245.17	Yes	Yes
Sec. 7: Lots 6, 11	81.74	Yes	Yes
Sec. 9: Lots 3, 4	80.98	Yes	Yes
Sec. 10: Lot 2	41.15	Yes	Yes
Sec. 11: Lot 8	40.85	Yes	Yes
Sec. 12: Lot 1	39.43	Yes	Yes
Sec. 13: Lot 9	39.88	Yes	Yes
Sec. 17: Lots 4, 6	81.65	Yes	Yes
Sec. 18: Lots 5, 20	81.64	Yes	Yes
Sec. 19: Lots 6, 11	81.45	Yes	Yes
Sec. 20: Lots 3, 4, 6, 7, 9, 10, 13, 16	327.03	Yes	Yes
Sec. 23: Lot 9	39.20	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 29: Lots 1, 8	81.70	Yes	Yes
Sec. 33: Lots 9, 10	80.67	Yes	Yes
T. 57 N., R. 74 W.,			
Sec. 4: SWNW	40.03	Yes	Yes
Sec. 5: Lot 13, SESE	59.30	Yes	Yes
Sec. 7: E2NW	80.04	Yes	Yes
Sec. 8: Lot 1	38.57	Yes	Yes
Sec. 14: S2NW, NWSW	120.41	Yes	Yes
Sec. 15: NE, NESE	200.18	Yes	Yes
Sec. 17: Lots 1, 2, NWNW	81.00	Yes	Yes
Sec. 18: NENE	40.00	Yes	Yes
Sec. 23: Lot 2, SENW	66.13	Yes	Yes
Sec. 27: Lots 6, 7	72.46	Yes	Yes
Sec. 31: Lots 7, 8, 14	120.05	Yes	Yes
Sec. 32: Lots 9-12	205.95	Yes	Yes
Sec. 34: Lots 1, 2, NENE	84.82	Yes	Yes
Sec. 35: SWNW	39.92	Yes	Yes
T. 58 N., R. 74 W.,			
Sec. 26: W2SE	80.00	Yes	Yes
Sec. 29: Lot 8	20.55	Yes	Yes
Sec. 30: Lot 13	21.90	Yes	Yes
Sec. 32: SWNE	40.01	Yes	Yes
Range 75 West			
T. 43 N., R. 75 W.,			
Sec. 3: SENW	43.08	Yes	Yes
T. 47 N., R. 75 W.,			
Sec. 2: Lots 5, 6, 11-20	483.93	Yes	Yes
Sec. 3: Lots 6-8	120.44	Yes	Yes
Sec. 5: Lots 7, 8	82.22	Yes	Yes
Sec. 7: Lots 9, 10, 13-20	393.41	Yes	Yes
Sec. 8: Lot 3	40.94	Yes	Yes
Sec. 12: Lots 3-6, 13	202.11	Yes	Yes
Sec. 13: Lot 14	39.91	Yes	Yes
Sec. 21: Lot 13	39.42	Yes	Yes
Sec. 23: Lots 3, 6	80.48	Yes	Yes
T. 48 N., R. 75 W.,			
Sec. 4: Lots 8, 9	75.35	Yes	Yes
Sec. 5: Lots 7, 8	70.38	Yes	Yes
Sec. 33: Lots 9-16	323.43	Yes	Yes
Sec. 34: Lots 12, 13, SWSW	119.95	Yes	Yes
T. 49 N., R. 75 W.,			
Sec. 4: E2SE	81.61	Yes	Yes
Sec. 5: Lots 3, 4, S2NW, N2S2	322.49	Yes	Yes
Sec. 6: Lots 1, 2, S2NE, SE	323.18	Yes	Yes
Sec. 9: E2E2	163.32	Yes	Yes
Sec. 10: W2SW	81.31	Yes	Yes
Sec. 31: NWSE, N2SE	80.02	Yes	Yes
Sec. 32: SENE	39.82	Yes	Yes
T. 50 N., R. 75 W.,			
Sec. 5: Lots 13, 20	79.79	Yes	Yes
Sec. 6: Lots 14, 15	83.73	Yes	Yes
Sec. 9: Lots 3, 7, 15, 16	158.12	Yes	Yes
Sec. 15: Lots 5, 12	79.28	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 31: Lots 9, 10	79.28	Yes	Yes
T. 51 N., R. 75 W.,			
Sec. 1: Lots 5, 12, 13	114.96	No	Yes
Sec. 2: Lot 5	40.05	No	Yes
Sec. 7: Lots 18, 19	81.64	Yes	Yes
Sec. 10: Lot 14	39.84	Yes	Yes
Sec. 11: Lots 2, 5, 12	119.26	Yes	Yes
Sec. 13: Lot 13	39.91	Yes	Yes
Sec. 14: Lot 14	40.04	Yes	Yes
Sec. 15: Lots 11, 12	80.54	No	Yes
Sec. 19: Lots 11, 19	80.55	Yes	Yes
Sec. 20: Lot 7	40.73	Yes	Yes
Sec. 22: Lots 1, 8, 11, 13, 14	203.46	Yes	Yes
Sec. 24: Lots 2-4	120.64	Yes	Yes
Sec. 25: Lots 1-2, 13-15	201.18	Yes	Yes
Sec. 26: Lot 8	40.54	Yes	Yes
Sec. 27: Lots 2, 3, 6, 7	165.74	Yes	Yes
Sec. 32: Lots 9, 16	81.03	Yes	Yes
Sec. 33: Lots 1, 8, 9, 12, 13, 16	246.11	Yes	Yes
Sec. 34: Lots 2-4, 6, 7, 10, 11, 14, 15	369.94	Yes	Yes
Sec. 35: Lots 3, 8, 9	122.79	Yes	Yes
T. 52 N., R. 75 W.,			
Sec. 6: Lots 11, 17	72.32	Yes	Yes
Sec. 13: Lots 7, 9, 10, 15, 16	203.06	Yes	Yes
Sec. 21: Lot 12	39.77	Yes	Yes
Sec. 24: Lots 1, 2, 7-10	246.41	Yes	Yes
Sec. 26: Lot 6	41.57	Yes	Yes
Sec. 28: Lots 3, 4	85.94	Yes	Yes
Sec. 33: Lots 1-3	126.71	Yes	Yes
Sec. 34: Lots 5-7, 9-12	291.97	Yes	Yes
Sec. 35: Lot 10	42.37	Yes	Yes
T. 53 N., R. 75 W.,			
Sec. 5: Lot 12	39.80	Yes	Yes
Sec. 12: Lots 2, 8	80.39	Yes	Yes
Sec. 19: Lots 6, 7, 10, 11, 16, NESW	238.86	Yes	Yes
T. 54 N., R. 75 W.,			
Sec. 7: Lot 16	37.24	Yes	Yes
Sec. 18: Lot 8	37.21	Yes	Yes
Sec. 22: Lots 10, 11, 14, 15	160.24	Yes	Yes
T. 55 N., R. 75 W.,			
Sec. 5: Lot 10	40.70	Yes	Yes
Sec. 6: Lot 16	40.72	Yes	Yes
Sec. 7: Lots 6, 11	81.37	Yes	Yes
Sec. 15: Lots 9-12	158.48	Yes	Yes
Sec. 21: Lots 2, 3	80.07	Yes	Yes
Sec. 26: Lots 2, 3	80.78	Yes	Yes
Sec. 31: Lot 5	35.37	Yes	Yes
Sec. 34: Lot 14	34.88	Yes	Yes
T. 56 N., R. 75 W.,			
Sec. 2: Lots 5, 6	84.23	Yes	Yes
Sec. 4: Lots 7, 11-13, 20	216.21	Yes	Yes
Sec. 7: Lots 8-10, 16, 17	182.66	Yes	Yes
Sec. 8: Lot 5	41.94	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 15: Lots 15, 16	79.69	Yes	Yes
Sec. 27: Lot 4	40.63	Yes	Yes
T. 57 N., 75 W.,			
Sec. 3: SENE, SWNW	79.96	Yes	Yes
Sec. 4: Lot 6, SENE, SESE	119.12	Yes	Yes
Sec. 5: Lot 10, SENE	69.00	Yes	Yes
Sec. 8: SWNE	40.02	Yes	Yes
Sec. 9: NESE	39.88	Yes	Yes
Sec. 10: SESW, SWSE	79.95	Yes	Yes
Sec. 12: N2SW	79.95	Yes	Yes
Sec. 15: NW, NESW	199.96	Yes	Yes
Sec. 17: Lots 1, 3	45.34	Yes	Yes
Sec. 19: Lot 5	39.71	Yes	Yes
Sec. 25: S2NW	80.03	Yes	Yes
Sec. 26: SENW	40.00	Yes	Yes
Sec. 28: Lot 8	14.30	Yes	Yes
Sec. 33: Lots 5, 8, 13, 14, E2NW	263.62	Yes	Yes
Sec. 35: Lot 9	7.78	Yes	Yes
T. 58 N., R. 75 W.,			
Sec. 21: Lots 6-8, NWSW	172.91	Yes	Yes
Sec. 22: Lots 5, 6, N2SE, SESE	210.14	Yes	Yes
Sec. 23: Lot 8, W2SW	125.04	Yes	Yes
Sec. 26: SENE, NWNW, E2SW, SE	319.43	Yes	Yes
Sec. 33: NWNE, S2NE, NENW, E2SW, W2SE, NENSE	359.86	Yes	Yes
Sec. 34: S2NE, SWNW, W2SW, SE	360.00	Yes	Yes
Sec. 35: Lot 1, SWSW	52.12	Yes	Yes
Range 76 West			
T. 41 N., R. 76 W.,			
Sec. 6: Lots 5-7	118.81	Yes	Yes
Sec. 24: ALL	652.01	Yes	Yes
Sec. 25: NENE	40.40	Yes	Yes
Sec. 29: E2NE	83.51	Yes	Yes
T. 42 N., R. 76 W.,			
Sec. 19: Lots 5-8	166.56	Yes	Yes
Sec. 20: SESE	41.03	Yes	Yes
Sec. 21: SWNW, NWSW	81.46	Yes	Yes
Sec. 29: NENE	41.01	Yes	Yes
Sec. 31: Lot 5	40.13	Yes	Yes
T. 43 N., R. 76 W.,			
Sec. 30: SENE	40.54	Yes	Yes
T. 46 N., R. 76 W.,			
Sec. 12: Lots 14, 15	78.97	Yes	Yes
Sec. 13: Lots 2, 3, 6	117.16	Yes	Yes
Sec. 14: Lots 4,5, 12	119.14	Yes	Yes
Sec. 15: Lot 13	39.33	Yes	Yes
Sec. 23: Lots 3, 4, 11	119.08	Yes	Yes
T. 47 N., R. 76 W.,			
Sec. 1: Lot 18	37.62	Yes	Yes
Sec. 35: Lot 13	40.32	Yes	Yes
T. 48 N., R. 76 W.,			
Sec. 1: Lot 18	39.84	Yes	Yes
Sec. 2: Lot 11	39.62	Yes	Yes
Sec. 3: Lot 5	34.72	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 10: Lot 10	39.49	Yes	Yes
Sec. 12: Lots 6, 7	79.36	Yes	Yes
T. 49 N., R. 76 W.,			
Sec. 1: SENW, NESW	80.68	Yes	Yes
Sec. 14: NWSE	40.59	Yes	Yes
Sec. 23: SWNE, SENW, NESW, W2SE	202.64	Yes	Yes
Sec. 26: NWSE	40.11	Yes	Yes
Sec. 34: SESE	39.94	Yes	Yes
T. 50 N., R. 76 W.,			
Sec. 6: Lots 12, 23	81.48	No	Yes
Sec. 13: Lots 7, 8	80.79	No	Yes
Sec. 22: Lots 3-8	243.11	Yes	Yes
Sec. 26: Lot 7	40.52	Yes	Yes
Sec. 33: Lot 10	40.70	Yes	Yes
Sec. 34: Lots 12, 13	81.30	No	Yes
T. 51 N., R. 76 W.,			
Sec. 5: Lots 9, 10	81.70	Yes	Yes
Sec. 6: Lots 8, 9, 15	122.32	Yes	Yes
Sec. 20: Lots 3-6, 11-14	330.23	Yes	Yes
Sec. 31: Lots 19, 20	41.00	No	Yes
Sec. 32: Lots 1, 8	83.40	No	Yes
T. 52 N., R. 76 W.,			
Sec. 1: Lots 17	40.33	No	Yes
Sec. 2: Lots 7, 10, 19, 20	166.93	Yes	Yes
Sec. 11: Lots 1, 15, 16	123.23	Yes	Yes
Sec. 12: Lots 11, 14	82.34	Yes	Yes
Sec. 31: Lot 18	40.86	Yes	Yes
T. 53 N., R. 76 W.,			
Sec. 2: Lot 9	39.47	Yes	Yes
Sec. 10: Lots 7-10, 15, 16	234.60	Yes	Yes
Sec. 14: Lot 11	39.24	Yes	Yes
Sec. 15: Lots 1, 2	78.13	Yes	Yes
Sec. 24: Lots 15, 16	78.70	Yes	Yes
Sec. 27: Lot 3	39.36	Yes	Yes
Sec. 31: Lots 9, 10	76.22	Yes	Yes
T. 54 N., R. 76 W.,			
Sec. 1: Lot 20	40.16	Yes	Yes
Sec. 9: Lots 9, 10, 15, 16	155.52	Yes	Yes
Sec. 12: Lots 9, 10, 14, NESE	160.04	Yes	Yes
Sec. 17: Lots 9, 16	81.10	Yes	Yes
Sec. 20: Lot 7	39.75	Yes	Yes
Sec. 31: Lots 13, 14, 20	117.80	Yes	Yes
T. 55 N., R. 76 W.,			
Sec. 7: Lots 17, 18	67.68	Yes	Yes
Sec. 17: Lot 12	40.16	Yes	Yes
Sec. 18: Lots 5, 6, 11, 14, 20	182.69	Yes	Yes
Sec. 19: Lot 16	31.50	Yes	Yes
Sec. 20: Lot 11	39.81	Yes	Yes
Sec. 25: Lot 13	37.41	Yes	Yes
Sec. 26 Lots 3, 6	77.74	Yes	Yes
Sec. 29: Lots 4, 5	78.69	Yes	Yes
Sec. 35: Lots 1-3	110.82	Yes	Yes
T. 56 N., R. 76 W.,			

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 1: Lots 19, 20	89.68	Yes	Yes
Sec. 11: Lots 1, 7, 8, 10	172.39	Yes	Yes
Sec. 12: Lots 1-8	314.93	Yes	Yes
Sec. 13: Lots 4, 5, 12, 13	157.61	Yes	Yes
Sec. 14: Lots 1, 8, 10, 11, 14	199.08	Yes	Yes
Sec. 15: Lots 3, 4, 8	118.16	Yes	Yes
Sec. 21: Lots 8, 10	80.33	Yes	Yes
Sec. 23: Lots 1, 7-10, 14, 15	276.79	Yes	Yes
Sec. 31: Lot 13	39.26	Yes	Yes
Sec. 32: Lot 13	39.19	Yes	Yes
T. 57 N., R. 76 W.,			
Sec. 19: Lots 11, 14	53.67	Yes	Yes
Sec. 31: Lot 9	39.91	Yes	Yes
T. 58 N., R. 76 W.,			
Sec. 28: Lot 4	25.21	Yes	Yes
Sec. 32: Lot 1, 3	50.40	Yes	Yes
Sec. 36: Lots 1, 3-8	139.31	Yes	Yes
Range 77 West			
T. 41 N., R. 77 W.,			
Sec. 2: S2SE	80.36	Yes	Yes
Sec. 4: SWNW	41.59	Yes	Yes
Sec. 11: N2NE	79.06	Yes	Yes
Sec. 13: SWSW	41.64	Yes	Yes
Sec. 14: SWNE, S2	371.80	Yes	Yes
Sec. 24: SESW	40.97	Yes	Yes
T. 42 N., R. 77 W.,			
Sec. 2: W2SE	83.16	Yes	Yes
Sec. 12: E2SE	81.50	Yes	Yes
Sec. 13: E2E2	163.01	Yes	Yes
Sec. 14: W2SW	82.37	Yes	Yes
Sec. 22: E2SE, SE	164.24	Yes	Yes
Sec. 23: W2	329.67	Yes	Yes
Sec. 24: Lots 1-4	167.66	Yes	Yes
Sec. 27: S2	322.91	Yes	Yes
Sec. 32: SENE	40.54	Yes	Yes
Sec. 34: N2	320.17	Yes	Yes
T. 43 N., R. 77 W.,			
Sec. 23: SENE, NESE	80.98	Yes	Yes
Sec. 24: SWNW, NWSW	80.89	Yes	Yes
Sec. 34: N2SW	80.03	Yes	Yes
T. 44 N., R. 77 W.,			
Sec. 19: Lot 13	40.59	Yes	Yes
Sec. 30: Lots 11, 13-16	205.11	Yes	Yes
Sec. 33: Lot 12	40.05	Yes	Yes
Sec. 34: Lots 7, 8	78.61	Yes	Yes
Sec. 35: Lots 13, 14	78.28	Yes	Yes
T. 45 N., R. 77 W.,			
Sec. 4: Lot 21	39.89	Yes	Yes
Sec. 5: Lot 18	40.51	Yes	Yes
Sec. 6: Lot 19	40.01	Yes	Yes
Sec. 7: Lots 6-20	609.64	Yes	Yes
Sec. 8: Lots 10, 13-15	161.94	Yes	Yes
Sec. 18: Lots, 7-10	162.10	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 23: Lots 1, 8	80.42	Yes	Yes
T. 47 N., R. 77 W.,			
Sec. 13: Lots 7-10	151.26	Yes	Yes
Sec. 35: Lots 3, 4, 8	112.10	Yes	Yes
T. 48 N., R. 77 W.,			
Sec. 20: Lot 3	40.16	Yes	Yes
Sec. 30: Lots 8, 14, 16	120.87	Yes	Yes
T. 49 N., R. 77 W.,			
Sec. 22: SWSW	39.70	Yes	Yes
T. 50 N., R. 77 W.			
Sec. 5: Lot 6	13.95	Yes	Yes
Sec. 7: Lots 5-8	94.64	No	Yes
Sec. 8: Lots 1, 3	44.51	No	Yes
Sec. 9: Lot 5, SWSE	58.75	No	Yes
Sec. 10: Lot 1	6.02	No	Yes
Sec. 11: Lot 2, W2NW	85.86	No	Yes
Sec. 16: Lot 3	16.37	No	Yes
Sec. 17: Lot 3	31.70	No	Yes
Sec. 21: Lots 2, 6	64.67	No	Yes
Sec. 27: Lot 2	16.84	No	Yes
Sec. 34: Lot 5, NESW	88.12	No	Yes
T. 51 N., R. 77 W.,			
Sec. 12: NWNW	39.98	Yes	Yes
Sec. 29: Lots 4, 6	25.31	Yes	Yes
Sec. 30: Lots 5, 10	39.98	Yes	Yes
Sec. 32: SWNW	39.98	Yes	Yes
T. 52 N., R. 77 W.,			
Sec. 1: Lots 5-8, 11-14	276.65	Yes	Yes
Sec. 4: Lots 5-12, SWSW	282.99	Yes	Yes
Sec. 5: Lots 5, 6, 11, 12, 14	157.97	Yes	Yes
Sec. 6: Lots 15, 16, NESE	119.68	Yes	Yes
Sec. 8: NWNE	39.96	Yes	Yes
Sec. 16: Lot 1	2.89	No	Yes
Sec. 21: Lots 6, 7	17.48	Yes	Yes
Sec. 26: Lots 8, 9, 10	28.39	No	Yes
T. 53 N., R. 77 W.,			
Sec. 7: Lot 11	17.04	Yes	Yes
Sec. 8: Lots 1-3	22.88	Yes	Yes
Sec. 17: Lot 4	19.84	Yes	Yes
Sec. 26: Lot 5	41.53	Yes	Yes
Sec. 28: S2NW	79.91	Yes	Yes
Sec. 29: W2SE	80.03	Yes	Yes
T. 54 N., R. 77 W.,			
Sec. 27: NWNW	39.83	Yes	Yes
Sec. 32: NW, N2SW	239.91	Yes	Yes
T. 55 N., R. 77 W.,			
Sec. 4: SWNE	40.00	Yes	Yes
Sec. 6: Lot 8	32.12	Yes	Yes
Sec. 9: Lots 1, 2, SWNE	108.55	Yes	Yes
Sec. 12: SWSE	39.86	Yes	Yes
Sec. 13: Lot 1, W2SE	119.33	Yes	Yes
Sec. 14: Lots 2, 4, 5	80.93	Yes	Yes
Sec. 15: Lots 10, 11	43.18	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 20: E2E2	161.08	Yes	Yes
Sec. 21: SWNW, NWSW	80.47	Yes	Yes
Sec. 23: Lot 1, SENW, NESW, NWSE	151.94	Yes	Yes
Sec. 25: W2SW, SESW, SWSE	161.13	Yes	Yes
Sec. 28: NWNW	40.02	Yes	Yes
Sec. 29: E2NE	79.85	Yes	Yes
Sec. 32: NWNE, S2NE, N2SE	196.28	Yes	Yes
Sec. 33: Lots 3, 4, NWSW	103.37	Yes	Yes
Sec. 35: Lot 2, NWNE	68.81	Yes	Yes
T. 56 N., R. 77 W.,			
Sec. 4: Lot 19	45.93	Yes	Yes
Sec. 8: Lots 1, 4, NWSE	112.67	Yes	Yes
Sec. 16: Lots 1, 2	14.01	Yes	Yes
Sec. 18: Lots 5-9	94.19	Yes	Yes
Sec. 19: Lot 8, SESE	69.22	Yes	Yes
Sec. 26: Lot 3, NWSW	54.35	Yes	Yes
Sec. 29: Lots 1, 4	39.04	Yes	Yes
Sec. 30: Lot 5	13.62	Yes	Yes
Sec. 31: Lot 8	39.96	Yes	Yes
Sec. 32: NWNE	40.03	Yes	Yes
Sec. 34: SWSE	39.61	Yes	Yes
Sec. 35: Lot 7	33.03	Yes	Yes
Sec. 36: Lots 1, 2	10.99	Yes	Yes
T. 57 N., R. 77 W.,			
Sec. 7: Lot 6, Tract 41E	57.60	Yes	Yes
Sec. 11: N2NE, NENW, SENE, NESE	199.89	Yes	Yes
Sec. 12: Lots 3, 4, S2, W2SE	324.70	Yes	Yes
Sec. 13: NENW	39.29	Yes	Yes
Sec. 16: Lot 1	5.66	Yes	Yes
Sec. 17: Lots 6, 7	10.87	Yes	Yes
Sec. 18: Lot 8	30.57	Yes	Yes
Sec. 19: SENW, SESW	79.66	Yes	Yes
Sec. 21: Lot 1	4.97	Yes	Yes
Sec. 35: Lot 3, NWSE	84.05	Yes	Yes
T. 58 N., R. 77 W.,			
Sec. 19: NWSE	39.97	Yes	Yes
Sec. 21: Lots 6-8	70.60	Yes	Yes
Sec. 21: Lots 9, 10	21.26	No	Yes
Sec. 22: Lot 14	6.38	Yes	Yes
Sec. 26: Lot 4	6.27	No	Yes
Sec. 27: Lot 1	8.77	No	Yes
Sec. 28: W2SW	79.93	Yes	Yes
Sec. 29: NWNE, NENW	79.91	Yes	Yes
Range 78 West			
T. 42 N., R. 78 W.,			
Sec. 2: SW	167.65	Yes	Yes
Sec. 3: SE	166.49	Yes	Yes
Sec. 4: S2NW, N2SW, SESW	204.87	Yes	Yes
Sec. 5: SENE	39.53	Yes	Yes
Sec. 8: NWNW	39.11	Yes	Yes
Sec. 13: SW	158.91	Yes	Yes
Sec. 17: S2NE, SENW, NESE	156.17	Yes	Yes
Sec. 18: Lot 3, NESW	75.43	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 19: SENE	39.71	Yes	Yes
T. 43 N., R. 78 W.,			
Sec. 12: W2	309.90	Yes	Yes
Sec. 20: SWSE	39.70	Yes	Yes
Sec. 28: ALL	628.67	Yes	Yes
Sec. 29: NWNE, NESE	78.57	Yes	Yes
Sec. 30: Lots 1, 2, NE, E2NW	307.20	Yes	Yes
Sec. 31: Lots 3, 4, E2SW	145.12	Yes	Yes
Sec. 32: W2NW	77.61	Yes	Yes
T. 44 N., R. 78 W.,			
Sec. 3: Lot 17	41.64	Yes	Yes
Sec. 4: Lot 19	40.57	Yes	Yes
Sec. 9: Lot 3	40.40	Yes	Yes
Sec. 23: Lot 6	42.24	Yes	Yes
Sec. 25: Lots 2-4, 8, 9, 14, 15	295.09	Yes	Yes
Sec. 30: Lot 7	31.35	Yes	Yes
T. 45 N., R. 78 W.,			
Sec. 1: NESW, S2SW	123.54	Yes	Yes
Sec. 5: Lot 1, SENE	81.43	Yes	Yes
Sec. 9: SWSE	41.22	Yes	Yes
Sec. 12: SENE	40.20	Yes	Yes
Sec. 26: SESW	39.96	Yes	Yes
T. 47 N., R. 78 W.,			
Sec. 6: Lots 10, 13	82.76	Yes	Yes
Sec. 19: Lots 6, 11	81.25	Yes	Yes
T. 48 N., R. 78 W.,			
Sec. 10: Lots 1, 2, 7, 8	158.76	Yes	Yes
T. 50 N., R. 78 W.,			
Sec. 19: Lots 15, 16	77.61	No	Yes
T. 51 N., R. 78 W.,			
Sec. 10: Lots 9, 12, 16	119.63	No	Yes
Sec. 29: Lots 7-10	160.93	Yes	Yes
T. 52 N., R. 78 W.,			
Sec. 1: Lot 8	55.21	Yes	Yes
Sec. 2: Lot 5	54.89	Yes	Yes
Sec. 17: SENW	39.96	Yes	Yes
Sec. 18: Lots 7, 9, NE, NESE	269.25	Yes	Yes
Sec. 20: Lot 1	10.63	Yes	Yes
Sec. 33: Lot 4	44.73	Yes	Yes
T. 53 N., R. 78 W.,			
Sec. 1: Lots 5-10, S2NW	299.66	Yes	Yes
Sec. 2: Lots 5-8, S2N2, E2SE	332.81	Yes	Yes
Sec. 3: Lot 7	16.14	Yes	Yes
Sec. 15: Lot 1	15.96	Yes	Yes
Sec. 22: W2E2	159.54	Yes	Yes
Sec. 25: Lot 3, NWSE	70.57	Yes	Yes
Sec. 27: N2	319.26	Yes	Yes
Sec. 28: NE, E2SE	239.59	Yes	Yes
Sec. 32: E2NE, SWNE	119.65	Yes	Yes
Sec. 33: Lot 1, E2NE, NESE	155.09	Yes	Yes
Sec. 35: NESE	39.94	Yes	Yes
T. 54 N., R. 78 W.,			
Sec. 2: Lots 7-9, 11	160.74	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 3: Lots 5-7, 10-20	559.46	Yes	Yes
Sec. 4: Lots 13, 20	79.28	Yes	Yes
Sec. 6: Lots 19, 20, 24, 25	114.15	Yes	Yes
Sec. 7: Lots 17, 18, 23, 32	119.22	Yes	Yes
Sec. 8: Lot 5	40.13	Yes	Yes
Sec. 10: Lots 6, 11, 14	120.71	Yes	Yes
Sec. 15: Lots 1, 2	80.42	Yes	Yes
Sec. 20: Lots 1, 2, 8	120.71	Yes	Yes
Sec. 22: Lots 11-14	161.95	Yes	Yes
Sec. 24: Lot 7	39.87	Yes	Yes
Sec. 29: Lots 3-6, 11-14	320.85	Yes	Yes
Sec. 30: Lots 13, 14, 21-24, 31, 32	322.21	Yes	Yes
Sec. 33: Lot 4	40.61	Yes	Yes
Sec. 35: Lot 16	40.42	Yes	Yes
T. 55 N., R. 78 W.,			
Sec. 1: Lot 8	52.59	Yes	Yes
Sec. 9: Lots 4-6	114.63	Yes	Yes
Sec. 10: Lot 5	28.68	Yes	Yes
Sec. 15: Lot 1	1.49	No	Yes
Sec. 16: Lot 1	5.91	No	Yes
Sec. 17: Lots 5, 6	69.51	Yes	Yes
Sec. 22: Lot 4	23.34	Yes	Yes
Sec. 23: Lots 1,2	11.13	No	Yes
Sec. 27: Lot 2, SESE	62.50	Yes	Yes
Sec. 29: Lot 4	2.34	Yes	Yes
Sec. 30: Lots 5, 6	24.08	Yes	Yes
Sec. 31: Lots 7-8, 13-24	472.76	Yes	Yes
Sec. 31: Lot 9	52.35	No	
Sec. 32: Lot 2	7.21	Yes	Yes
Sec. 32: Lot 3	18.15	No	
Sec. 34: NWSE	39.95	Yes	Yes
T. 56 N., R 78 W.,			
Sec. 3: Lot 15	19.66	Yes	Yes
Sec. 25: E2NE	79.81	Yes	Yes
T. 57 N., R. 78 W.,			
Sec. 2: Lot 2, SWNE	80.79	Yes	Yes
Sec. 3: Lot 3	39.43	Yes	Yes
Sec. 4: SENE	39.37	Yes	Yes
Sec. 5: SENW, NWSW	78.76	Yes	Yes
Sec. 7: SENE	39.51	Yes	Yes
Sec. 12: W2NW	78.71	Yes	Yes
Sec. 13: SWNE	38.33	Yes	Yes
Sec. 23: SENW	37.56	Yes	Yes
Sec. 24: NESE	39.47	Yes	Yes
T. 58 N., R. 78 W.,			
Sec. 23: Lots 1, 2	35.51	Yes	Yes
Sec. 26: NESE	37.61	Yes	Yes
Sec. 27: NENE	37.93	Yes	Yes
Sec. 30: Lot 1	36.77	Yes	Yes
Sec. 31: SWNE	39.56	Yes	Yes
Sec. 33: N2SW, SESW, NWSE, S2SE	232.77	Yes	Yes
Sec. 34: S2SW	76.90	Yes	Yes
Sec. 35: S2SE	75.58	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Range 79 West			
T. 42 N., R. 79 W.,			
Sec. 25: W2NW, SENW	116.15	Yes	Yes
Sec. 26: N2NE, NENW	117.30	Yes	Yes
Sec. 27: N2NW	79.27	Yes	Yes
Sec. 28: NENE	39.29	Yes	Yes
T. 43 N., R. 79 W.,			
Sec. 19: Lot 4, SESW, NESE	115.72	Yes	Yes
Sec. 20: S2NE, SWNW, NWSW	152.06	Yes	Yes
Sec. 21: S2NW, S2SW	160.40	Yes	Yes
Sec. 23: NENW	40.75	Yes	Yes
Sec. 25: SW	157.61	Yes	Yes
Sec. 27: S2SW, NESW, SE	271.79	Yes	Yes
Sec. 30: Lot 1, NENW	74.30	Yes	Yes
T. 44 N., R. 79 W.,			
Sec. 4: Lots 1, 2	66.90	Yes	Yes
Sec. 6: Lots 4-7	121.76	Yes	Yes
Sec. 24: N2NW	78.62	Yes	Yes
T. 45 N., R. 79 W.,			
Sec. 3: SW, W2SE, SESE	279.54	Yes	Yes
Sec. 4: SENW	40.15	Yes	Yes
Sec. 12: SWNE	40.29	Yes	Yes
Sec. 30: NE	160.61	Yes	Yes
T. 46 N., R. 79 W.,			
Sec. 3: Lots 1, 2, S2NE, SE	318.75	Yes	Yes
Sec. 11: NE	161.19	Yes	Yes
T. 47 N., R. 79 W.,			
Sec. 4: Lots 19, 20	80.19	Yes	Yes
Sec. 9: Lots 1, 2, 7-10, 15, 16	321.17	Yes	Yes
Sec. 10: Lot 4	40.20	Yes	Yes
Sec. 22: Lots 15, 16	80.09	Yes	Yes
T. 48 N., R. 79 W.,			
Sec. 5: Lots 15-18, SW	160.10	Yes	Yes
Sec. 6: Lots 16, 22, 23	120.58	Yes	Yes
Sec. 7: Lots 5-13, 20	391.81	Yes	Yes
Sec. 10: Lots 13, 15, SESW	119.81	Yes	Yes
Sec. 14: Lots 3, 4, 6, 7, 9-11	280.61	Yes	Yes
Sec. 15: Lots 1, 5, 11	119.84	Yes	Yes
T. 49 N., R. 79 W.,			
Sec. 17: Lots 12-15	160.30	Yes	Yes
Sec. 20: Lots 2-5, 12, 13	239.82	Yes	Yes
Sec. 24: Lots 10, 15	79.83	Yes	Yes
Sec. 26: Lots 3-5, 12	158.95	Yes	Yes
Sec. 27: Lot 13	40.04	Yes	Yes
Sec. 29: Lots 3-11, 14-16	476.01	Yes	Yes
Sec. 30: Lots 8, 17	79.85	Yes	Yes
Sec. 35: Lot 8	39.82	Yes	Yes
T. 50 N., R. 79 W.,			
Sec. 17: SESW	39.96	Yes	Yes
Sec. 20: SESE	39.88	Yes	Yes
Sec. 22: Lot 13	39.90	Yes	Yes
Sec. 27: Lots 4, 11, 12, SWNW	159.97	Yes	Yes
T. 52 N., R. 79 W.,			

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 1: Lots 9-11	25.44	Yes	Yes
Sec. 3: Lots 5-7	37.89	No	Yes
Sec. 5: Lots 6, 9, 10	65.90	Yes	Yes
Sec. 7: Lot 7, Tracts 43A, 43B	88.44	Yes	Yes
Sec. 10: Lots 2, 4, 7, SWSW	132.49	No	Yes
Sec. 14: Lot 5	12.53	Yes	Yes
Sec. 17: Tracts 43C, 43H	79.95	Yes	Yes
Sec. 18: Lots 3, 4	16.92	No	Yes
Sec. 19: Lots 5, 6	75.78	Yes	Yes
Sec. 22: W2NE, NWSE	119.90	Yes	Yes
Sec. 31: S2NENE	18.58	No	Yes
Sec. 35: Lots 1, 2	20.97	Yes	Yes
T. 53 N., R. 79 W.,			
Sec. 11: NESE	39.71	Yes	Yes
Sec. 17: Lot 7	22.86	Yes	Yes
Sec. 19: Lot 21, SWSE	81.76	Yes	Yes
Sec. 20: Lot 1, Tracts 55A, 55B, 55C, 55D, 55G, 55H	227.66	Yes	Yes
Sec. 21: Lots 2-6, Tract 55E, portion of 55E, SENE, NESW, W2SE	340.36	Yes	Yes
Sec. 28: NWSW, portion of Tract 55F	50.01	Yes	Yes
Sec. 29: Portions of tracts 55H, 55G, 55F	26.16	Yes	Yes
Sec. 30: Tract 57I	39.56	Yes	Yes
Sec. 32: Lot 1	12.36	No	Yes
Sec. 34: Tract 67, SENW	87.13	Yes	Yes
T. 54 N., R. 79 W.,			
Sec. 2: Lots 14, 15	84.49	Yes	Yes
Sec. 3: Lot 5	42.81	Yes	Yes
Sec. 10: Lot 1	40.53	Yes	Yes
Sec. 25: Lot 13	40.25	Yes	Yes
T. 55 N., R. 79 W.,			
Sec. 6: Lot 9	40.14	Yes	Yes
Sec. 13: Lot 13	39.61	Yes	Yes
Sec. 14: Lots 9-11	118.53	Yes	Yes
Sec. 15: Lots 7, 8	78.21	Yes	Yes
Sec. 17: Lot 4	39.82	Yes	Yes
Sec. 18: Lots 5, 6, 12	118.93	Yes	Yes
Sec. 19: Lots 5, 11-14	197.71	Yes	Yes
Sec. 20: Lots 3-6, 9, 11-16	436.67	Yes	Yes
Sec. 21: Lot 13	39.61	Yes	Yes
Sec. 26: Lot 5	40.41	Yes	Yes
Sec. 27: Lots 1, 2, 8	119.21	Yes	Yes
Sec. 32: Lot 4	38.98	Yes	Yes
Sec. 33: Lots 8, 9	80.83	Yes	Yes
Sec. 34: Lot 2	40.06	Yes	Yes
T. 56 N., R. 79 W.,			
Sec. 1: Lots 5-12	337.85	Yes	Yes
Sec. 2: Lots 5-7, 10-12, 14, 15	292.65	Yes	Yes
Sec. 4: Lots 5-17, N2SW, SESW	541.01	Yes	Yes
Sec. 5: NWSE	40.16	Yes	Yes
Sec. 6: Lots 8, 9	108.21	Yes	Yes
Sec. 13: TRACT 51B	39.10	Yes	Yes
Sec. 17: Lot 1	12.03	Yes	Yes
Sec. 23: Lot 1	11.68	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 26: Lots 1, 2	24.37	Yes	Yes
T. 57 N., R. 79 W.,			
Sec. 5: SENE, NWSW	80.56	Yes	Yes
Sec. 6: Lot 1	40.68	Yes	Yes
Sec. 7: NWNE	40.65	Yes	Yes
Sec. 7: SENE	40.00	No	Yes
Sec. 8: SENW, SW	200.89	Yes	Yes
Sec. 11: SENW	40.10	Yes	Yes
Sec. 18: Lots 3, 4, SESW, NESE	157.52	Yes	Yes
Sec. 19: Lot 1, NWNE, NENW	118.95	Yes	Yes
Sec. 22: SENW	39.61	Yes	Yes
Sec. 26: W2NW	78.61	Yes	Yes
Sec. 27: SWNE, SWSW, NWSE, SESE	157.76	Yes	Yes
Sec. 28: SW, W2SE, SESE	274.68	Yes	Yes
Sec. 30: Lot 4, NESW, S2SE	156.29	Yes	Yes
Sec. 31: Lots 1-4, NE, SENW, E2SW, SE	593.74	Yes	Yes
Sec. 33: N2, SW	469.76	Yes	Yes
Sec. 34: NENW, W2NW, SESE	157.18	Yes	Yes
Sec. 35: S2SW, NESE	117.10	Yes	Yes
T. 58 N., R. 79 W.,			
Sec. 18: Lot 2	32.97	Yes	Yes
Sec. 19: Lot 4, E2NE	121.32	Yes	Yes
Sec. 20: E2NE	82.31	Yes	Yes
Sec. 25: SE	162.08	Yes	Yes
Sec. 31: Lots 1, 4, E2SE	158.26	Yes	Yes
Sec. 34: NESW	40.99	Yes	Yes
Range 80 West			
T. 41 N., R. 80 W.,			
Sec. 17: NENE, NWNW	75.96	Yes	Yes
Sec. 21: E2NW, SESE	117.18	Yes	Yes
Sec. 22: E2SW	77.22	Yes	Yes
T. 42 N., R. 80 W.,			
Sec. 17: S2SW, SWSE	115.57	Yes	Yes
Sec. 18: SESE	37.30	Yes	Yes
Sec. 20: NESW, NESE	77.14	Yes	Yes
Sec. 21: NWSW	38.97	Yes	Yes
Sec. 29: SESW	38.85	Yes	Yes
T. 43 N., R, 80 W.,			
Sec. 7: E2NE, NESE	102.60	Yes	Yes
Sec. 8: N2, N2S2	467.52	Yes	Yes
Sec. 11: E2SE	80.59	Yes	Yes
Sec. 14: NWNE	40.71	Yes	Yes
Sec. 17: SWSE	36.96	Yes	Yes
Sec. 18: Lots 1, 2, SESE	104.99	Yes	Yes
Sec. 19: E2NE	79.23	Yes	Yes
T. 45 N., R. 80 W.,			
Sec. 5: SENW, E2SW, W2SE	200.91	Yes	Yes
Sec. 7: Lot 1, SESE	83.31	Yes	Yes
T. 48 N., R. 80 W.,			
Sec. 10: NENE	40.35	Yes	Yes
Sec. 21: SENW	40.49	Yes	Yes
Sec. 23: Lots 13, 14	81.26	Yes	Yes
Sec. 26: Lots 3-6, 11-14	319.80	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
T. 49 N., R. 80 W.,			
Sec. 2: SENW	39.97	Yes	Yes
T. 50 N., R. 80 W.,			
Sec. 2: Lots 9, 10, NESE	52.29	Yes	Yes
Sec. 10: E2	318.33	Yes	Yes
Sec. 15: W2E2	158.83	Yes	Yes
Sec. 28: NENE, W2NE	120.09	Yes	Yes
Sec. 34: W2E2, E2NW	239.58	Yes	Yes
T. 51 N., R. 80 W.,			
Sec. 4: Lots 7, 10	79.99	Yes	Yes
Sec. 5: Lots 5, 6, 7	67.93	Yes	Yes
Sec. 7: Lots 5, 6	49.99	Yes	Yes
Sec. 8: Lots 1-3, NWNE	127.91	Yes	Yes
Sec. 12: Lots 2, 3	79.15	Yes	Yes
Sec. 28: Lot 1	39.96	Yes	Yes
T. 52 N., R. 80 W.,			
Sec. 1: Lot 12, SWSE	50.41	Yes	Yes
Sec. 9: Tract 48A	18.15	Yes	Yes
Sec. 10: Tract 48A	21.68	Yes	Yes
Sec. 12: Lots 5, 8	49.24	Yes	Yes
Sec. 14: Lot 1	11.16	Yes	Yes
Sec. 15: Lot 1	38.49	Yes	Yes
Sec. 23: Lot 1	26.26	Yes	Yes
Sec. 29: Lot 6, N2SW, SESW	137.60	Yes	Yes
Sec. 32: Tracts 91E, 91F, 91G	91.71	Yes	Yes
Sec. 33: Lot 1	5.89	Yes	Yes
T. 53 N., R. 80 W.,			
Sec. 4: N2SE	81.10	Yes	Yes
T. 54 N., R. 80 W.,			
Sec. 10: NWNE	39.76	Yes	Yes
Sec. 11: SWNW	40.29	Yes	Yes
T. 55 N., R. 80 W.,			
Sec. 3: SWSW	39.44	Yes	Yes
Sec. 10: SESW	40.10	Yes	Yes
Sec. 23: NESE	38.76	Yes	Yes
Sec. 24: SWSW	39.43	Yes	Yes
Sec. 26: NESW	39.18	Yes	Yes
T. 56 N., R. 80 W.,			
Sec. 31: Lot 6	43.60	Yes	Yes
T. 57 N., R. 80 W.,			
Sec. 3: Lot 2	39.31	Yes	Yes
Sec. 11: N2NE, SENE	118.82	Yes	Yes
Sec. 12: N2, SE	478.23	Yes	Yes
Sec. 25: SWNE, S2NW	118.25	Yes	Yes
T. 58 N., R. 80 W.,			
Sec. 13: Lots 1, 2	74.90	Yes	Yes
Sec. 14: Lot 1	36.95	Yes	Yes
Sec. 21: NENW	40.42	Yes	Yes
Range 81 West			
T. 42 N., R. 81 W.,			
Sec. 11: NESW	40.53	Yes	Yes
T. 43 N., R. 81 W.,			
Sec. 5: NWSE	40.07	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 14: SESE	39.56	Yes	Yes
Sec. 19: Lot 2, SWNE, SENW	119.94	Yes	Yes
Sec. 23: SESE	39.96	Yes	Yes
T. 44 N., R. 81 W.,			
Sec. 9: SESW, SWSE	79.95	Yes	Yes
Sec. 14: W2SW	80.14	Yes	Yes
Sec. 15: SWNW	39.91	Yes	Yes
Sec. 17: NW, NESW	200.47	Yes	Yes
Sec. 18: Lots 3, 4, E2NE	157.34	Yes	Yes
Sec. 20: SESW	40.02	Yes	Yes
Sec. 21: SENE	39.86	Yes	Yes
Sec. 22: NE, N2NW, E2SE	319.90	Yes	Yes
Sec. 23: W2W2	159.84	Yes	Yes
Sec. 25: W2W2, NESW	201.59	Yes	Yes
Sec. 26: E2	320.05	Yes	Yes
Sec. 29: E2NW, NWSE	120.08	Yes	Yes
Sec. 31: E2NE	79.68	Yes	Yes
Sec. 32: W2NW	80.08	Yes	Yes
Sec. 33: SESW	40.07	Yes	Yes
T. 45 N., R. 81 W.,			
Sec. 3: S2NW, NWSW	119.98	Yes	Yes
Sec. 7: Lot 1	38.45	Yes	Yes
Sec. 21: SWSW	40.30	Yes	Yes
Sec. 28: SE	161.94	Yes	Yes
Sec. 29: SWSE	40.34	Yes	Yes
Sec. 33: SENE	40.44	Yes	Yes
T. 46 N., R. 81 W.,			
Sec. 4: Lot 2	38.66	Yes	Yes
T. 47 N., R. 81 W.,			
Sec. 7: Lot 1, NWNE, NENW	114.45	Yes	Yes
Sec. 8: NWNW	39.78	Yes	Yes
Sec. 25: NWSE	40.05	Yes	Yes
T. 48 N., R. 81 W.,			
Sec. 18: Lot 4	35.85	Yes	Yes
Sec. 19: Lots 1-4	143.91	Yes	Yes
Sec. 30: Lot 1, 2	72.31	Yes	Yes
Sec. 31: SENE, W2SE	121.90	Yes	Yes
T. 50 N., R. 81 W.,			
Sec. 27: W2SW	80.44	Yes	Yes
Sec. 28: E2SE	80.18	Yes	Yes
Sec. 33: NENE	40.06	Yes	Yes
Sec. 34: N2NW	80.34	Yes	Yes
T. 52 N., R. 81 W.,			
Sec. 7: SWSE	39.50	Yes	Yes
Sec. 18: Lot 2	39.98	Yes	Yes
Sec. 33: E2NE	79.90	Yes	Yes
T. 53 N., R. 81 W.,			
Sec. 35: SESE	40.12	Yes	Yes
T. 55 N., R. 81 W.,			
Sec. 1: SWSE	40.55	Yes	Yes
Sec. 8: NWSW	39.91	Yes	Yes
Sec. 10: SENW, NESW, NWSE	121.59	Yes	Yes
Sec. 11: SWNW, NWSW	79.53	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 15: SENW	40.17	Yes	Yes
Sec. 26: Lots 1-5	199.74	Yes	Yes
T. 56 N., R. 81 W.,			
Sec. 20: NWSE	39.58	Yes	Yes
Sec. 23: NENW	39.73	Yes	Yes
Sec. 27: SWSW	39.07	Yes	Yes
Sec. 31: Lot 2, SENE	78.55	Yes	Yes
T. 57 N., R. 81 W.,			
Sec. 29: W2NW	79.95	Yes	Yes
Sec. 32: NWSW	39.98	Yes	Yes
Range 82 West			
T. 41 N., R. 82 W.,			
Sec. 1: Lot 4, SENE, E2SE	158.00	No	Yes
Sec. 12: NESE	38.92	No	Yes
Sec. 19: SENE, S2SE	119.98	Yes	Yes
Sec. 21: SWNW	40.01	No	Yes
Sec. 22: NENE	39.83	No	Yes
Sec. 29: W2NE, NW	239.13	Yes	Yes
Sec. 30: E2NE	79.99	Yes	Yes
T. 42 N., R. 82 W.,			
Sec. 6: Lots 1-3, SENW, NESW, N2SE, SESE	314.83	Yes	Yes
Sec. 7: Lot 1	37.53	Yes	Yes
Sec. 8: NE, E2NW	238.36	Yes	Yes
Sec. 18: W2E2	158.51	Yes	Yes
Sec. 19: Lots 2-4, E2NW, E2SW, W2SE, NESE	397.39	Yes	Yes
T. 43 N., R. 82 W.,			
Sec. 2: Lot 4	39.51	Yes	Yes
Sec. 3: SWNW, NWSW	79.64	Yes	Yes
Sec. 4: Lots 1, 2, N2SE, SWSE	197.20	Yes	Yes
Sec. 9: SESE	40.19	No	Yes
Sec. 14: E2SW	79.29	Yes	Yes
Sec. 15: SESW	38.87	Yes	Yes
Sec. 18: Lots 3, 4, E2SW	154.26	Yes	Yes
Sec. 22: N2NE, E2NW	157.08	Yes	Yes
Sec. 23: N2N2, SWNW, SESE	237.72	Yes	Yes
Sec. 26: NE, E2NW	237.80	Yes	Yes
Sec. 28: SENE	39.62	No	Yes
Sec. 31: E2SW, NWSSE, E2SE	199.95	Yes	Yes
T. 44 N., R. 82 W.,			
Sec. 2: SWSW	40.35	Yes	Yes
Sec. 3: SESW, S2SE	121.10	Yes	Yes
Sec. 7: S2SE	82.55	Yes	Yes
Sec. 8: W2NE, NWSE	123.45	Yes	Yes
Sec. 9: W2NE, N2SE	165.09	Yes	Yes
Sec. 11: NWNW	40.61	Yes	Yes
Sec. 17: N2NE, SENE	121.99	Yes	Yes
Sec. 18: NENE	40.46	Yes	Yes
Sec. 19: Lot 2, SENW	77.37	Yes	Yes
Sec. 30: NWSE	40.51	Yes	Yes
Sec. 34: S2NE, SENW, NESW, N2SE	240.37	Yes	Yes
Sec. 35: SWNW, W2SW	120.71	Yes	Yes
T. 45 N., R. 82 W.,			
Sec. 2: N2SW, W2SE	160.53	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 13: NENE	40.73	Yes	Yes
Sec. 23: NWNW	40.56	Yes	Yes
Sec. 25: NENE	40.33	Yes	Yes
T. 46 N., R. 82 W.,			
Sec. 4: SWSE	39.78	Yes	Yes
T. 47 N., R. 82 W.,			
Sec. 31: NESE	39.51	Yes	Yes
T. 48 N., R. 82 W.,			
Sec. 9: NWSW	40.12	Yes	Yes
Sec. 18: NWSE	39.58	Yes	Yes
Sec. 20: NENW	40.04	Yes	Yes
Sec. 29: SWNW	39.90	Yes	Yes
Sec. 32: SESE	39.84	Yes	Yes
T. 49 N., R. 82 W.,			
Sec. 31: Lot 4	39.43	Yes	Yes
T. 50 N., R 82 W.,			
Sec. 30: NWNE	40.14	Yes	Yes
T. 52 N., R. 82 W.,			
Sec. 2: Lots 3, 4, N2SW	167.28	Yes	Yes
Sec. 3: Lot 1	43.49	Yes	Yes
T. 53 N., R. 82 W.,			
Sec. 13: NENE	41.19	Yes	Yes
Sec. 17: SESW, SWSE	81.57	Yes	Yes
Sec. 18: NESE	42.07	Yes	Yes
Sec. 33: NWNE, NESW	78.99	Yes	Yes
Sec. 35: SWSW	39.45	Yes	Yes
T. 56 N., R. 82 W.,			
Sec. 11: SWSE	40.40	Yes	Yes
Sec. 27: SWNW, NWSE	80.40	Yes	Yes
Sec. 28: E2NE, NESE	121.03	Yes	Yes
Sec. 31: SENE, E2SE	120.81	Yes	Yes
T. 57 N., R. 82 W.,			
Sec. 7: SWSE	40.41	Yes	Yes
Sec. 20: W2SE	81.24	Yes	Yes
Sec. 30: S2NE	81.09	Yes	Yes
T. 58 N., R. 82 W.,			
Sec. 21: SENE	40.91	Yes	Yes
Range 83 West			
T. 42 N., R. 83 W.,			
Sec. 2: S2NE, SENW, NESW	156.08	Yes	Yes
Sec. 11: S2SWNW, NWSENW, NENWSW, N2SWSW, SWSWSW	69.45	Yes	Yes
Sec. 12: N2SE	77.34	Yes	Yes
Sec. 14: NWNWNW, S2NWNW	30.55	Yes	Yes
Sec. 20: SESW	40.64	Yes	Yes
Sec. 25: W2NE	80.00	Yes	Yes
Sec. 29: NWNE	40.69	Yes	Yes
T. 43 N., R. 83 W.,			
Sec. 3: Lots 5, 6	22.36	Yes	Yes
Sec. 4: Lots 7-8, 11, SESE	138.63	Yes	Yes
Sec. 9: Lots 1, 4, Tract 44 I, NENE	141.68	Yes	Yes
Sec. 10: Lots 1, 2	23.49	Yes	Yes
Sec. 11: Lots 1-5	139.64	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 12: Lot 1	4.12	Yes	Yes
Sec. 13: Lots 1, 2, 5, 6	63.13	Yes	Yes
Sec. 14: Lots 1-5, E2NE, NWNE	248.88	Yes	Yes
Sec. 24: Lot 1	30.68	Yes	Yes
Sec. 26: Lots 6, 7	70.35	Yes	Yes
Sec. 27: Lots 3, 4	56.21	Yes	Yes
Sec. 35: Lot 4	38.19	Yes	Yes
T. 44 N., R. 83 W.,			
Sec. 2: Lot 5	61.82	Yes	Yes
Sec. 3: W2SW	79.55	Yes	Yes
Sec. 6: Lot 16	39.82	Yes	Yes
Sec. 12: SESE	39.83	Yes	Yes
Sec. 13: SESE	39.53	Yes	Yes
Sec. 23: NWNE, NENW, SESE	121.20	Yes	Yes
Sec. 24: SWNE, SENW, SW, W2SE	318.63	Yes	Yes
Sec. 25: E2NE, N2NW	160.19	Yes	Yes
Sec. 26: NENE	40.46	Yes	Yes
Sec. 33: SE	158.46	Yes	Yes
Sec. 34: E2NW, SWNW, SW	283.38	Yes	Yes
T. 45 N., R. 83 W.,			
Sec. 5: Lot 8	46.00	Yes	Yes
Sec. 7: Lots 8, 9	23.39	Yes	Yes
Sec. 8: Lots 2, 5	24.10	Yes	Yes
Sec. 9: Lot 9	23.13	Yes	Yes
Sec. 10: W2NE	81.64	Yes	Yes
Sec. 11: SWSE	48.14	Yes	Yes
Sec. 16: Tract 67, Lots 1, 2	10.21	Yes	Yes
Sec. 17: Lots 1-6, NWSW	211.41	Yes	Yes
Sec. 18: Lots 5, 6, 9	79.99	Yes	Yes
Sec. 20: Lot 2	17.61	Yes	Yes
Sec. 21: Lots 1, 2	65.23	Yes	Yes
T. 47 N., R. 83 W.,			
Sec. 26: NESW	40.21	No	Yes
Sec. 27: W2NE, S2NW	158.54	No	Yes
T. 48 N., R. 83 W.,			
Sec. 1: SWSW	39.40	Yes	Yes
T. 49 N., R. 83 W.,			
Sec. 1: SWNW	40.41	Yes	Yes
Sec. 2: Lots 1, 2	78.98	Yes	Yes
T. 50 N., R. 83 W.,			
Sec. 22: SENW	40.47	Yes	Yes
Sec. 27: SENW, NESW	80.60	Yes	Yes
T. 55 N., R. 83 W.,			
Sec. 4: Lot 3	39.90	Yes	Yes
T. 56 N., R. 83 W.,			
Sec. 12: W2E2	161.23	Yes	Yes
T. 57 N., R. 83 W.,			
Sec. 10: SENE	40.66	Yes	Yes
Sec. 13: SWSW	40.81	Yes	Yes
Sec. 14: SESE	40.68	Yes	Yes
Sec. 24: NWNW	40.78	Yes	Yes
T. 58 N., R. 83 W.,			
Sec. 24: Lot 2	32.36	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 25: W2SE	81.66	Yes	Yes
Range 84 West			
T. 57 N., R. 84 W.,			
Sec. 5: Lot 3, SESW, SWSE	127.50	Yes	Yes
Sec. 6: Lot 5	39.68	Yes	Yes
Sec. 9: SENW	39.69	Yes	Yes
T. 58 N., R. 84 W.,			
Sec. 17: Lot 1	31.81	Yes	Yes
Sec. 18: Lot 1	44.47	Yes	Yes
Sec. 20: N2NE	81.09	Yes	Yes
Sec. 21: NWNW	40.27	Yes	Yes
Range 85 West			
T. 42 N., R. 85 W.,			
Sec. 4: Lots 3, 4, SWNE, S2NW, SW, SESE	406.89	Yes	Yes
Sec. 5: Lots 1-3, S2NE	202.71	Yes	Yes
Sec. 18: N2NE	80.52	Yes	Yes
T. 43 N., R. 85 W.,			
Sec. 4: SWNE, NWSE	79.26	Yes	Yes
Sec. 5: Lots 1, 2	79.30	Yes	Yes
Sec. 8: N2NE, SENE	121.96	Yes	Yes
Sec. 17: W2NW, N2SW	160.49	Yes	Yes
Sec. 20: NWNE	40.33	Yes	Yes
Sec. 22: SWSW	39.80	Yes	Yes
Sec. 27: NWNE, NWNW	79.76	Yes	Yes
Sec. 35: N2SW	82.18	Yes	Yes
T. 44 N., R. 85 W.,			
Sec. 32: SESE	39.88	Yes	Yes
Sec. 33: N2SW	79.27	Yes	Yes
T. 45 N., R. 85 W.,			
Sec. 3: S2SW, SWSE	121.69	Yes	Yes
Sec. 4: SE, S2SE	80.70	Yes	Yes
Sec. 5: SESE	40.06	Yes	Yes
Sec. 6: Lot 6, NESW	81.06	Yes	Yes
Sec. 7: SESE	39.82	Yes	Yes
Sec. 9: NENE	40.70	Yes	Yes
Sec. 10: NENW	39.92	Yes	Yes
Sec. 12: W2SE	80.60	Yes	Yes
Sec. 15: NWNE, SENE, W2SW, E2SE	241.56	Yes	Yes
Sec. 18: Lots 1, 2, N2NE, NENW	198.96	Yes	Yes
Sec. 19: SENE, E2SE	119.52	Yes	Yes
Sec. 20: NWNW	40.15	Yes	Yes
Sec. 23: NESE	40.54	Yes	Yes
Sec. 24: NWSW	40.72	Yes	Yes
Sec. 30: E2NE	80.69	Yes	Yes
Sec. 34: SENE	40.43	Yes	Yes
Sec. 35: W2SW	79.69	Yes	Yes
T. 46 N., R. 85 W.,			
Sec. 5: SWNE, SENW	81.33	Yes	Yes
Sec. 6: Lot 2	40.22	Yes	Yes
T. 47 N., R. 85 W.,			
Sec. 19: Lots 3, 4	80.94	Yes	Yes
T. 53 N., R. 85 W.,			
Sec. 12: Lots 1-8, SENE, N2SW, SESW, N2SE, SWSE	317.57	Yes	Yes

Legal Description	Approximate Acreage	Alternative A (1985 RMP)	Alternatives B, C, D
T. 54 N., R. 85 W.,			
Sec. 27: NWNE, W2NW, NWSW, S2S2	319.08	Yes	Yes
T. 56 N., R. 85 W.,			
Sec. 8: N2NE	80.68	Yes	Yes
T. 58 N., R. 85 W.,			
Sec. 22: SWNE	40.83	Yes	Yes
Sec. 26: S2SW	80.54	Yes	Yes
Sec. 27: S2SE	81.13	Yes	Yes
Sec. 29: SENE	42.60	Yes	Yes
Range 86 West			
T. 55 N., R. 86 W.,			
Sec. 27: SW	160.40	Yes	Yes
Sec. 34: N2N2, SENE, SENW, NESW	279.15	Yes	Yes
T. 58 N., R. 86 W.,			
Sec. 13: Lots 1, 2	100.20	Yes	Yes
Sec. 14: Lot 4	37.76	Yes	Yes
Sec. 15: Lot 1	39.73	Yes	Yes
Sec. 22: NENE, SE	213.67	Yes	Yes
Sec. 23: W2SW	84.47	Yes	Yes
Sec. 26: W2SW	84.46	No	Yes
Sec. 27: SWNE, NWSE	84.96	Yes	Yes
Sec. 34: SWSW	42.20	Yes	Yes
Range 87 West			
T. 56 N., R. 87 W.,			
Sec. 5: Lots 5-7, 9-11	60.59	Yes	Yes
Sec. 23: S2S2	160.07	Yes	Yes
Sec. 25: S2SW	80.04	Yes	Yes
Sec. 36: ALL	648.59	Yes	Yes
T. 57 N., R. 87 W.,			
Sec. 19: Lots 1, 3, 4, E2SW, SE	342.96	Yes	Yes
Sec. 20: S2SW	78.40	Yes	Yes
Sec. 29: SW	154.32	Yes	Yes
Range 88 West			
T. 57 N., R. 88 W.,			
Sec. 14: Lot 1	19.71	Yes	Yes
Sec. 15: Lots 5, 6, S2SW	152.09	Yes	Yes
Sec. 16: Lot 3	26.29	Yes	Yes
Range 89 West			
T. 58 N., R. 89 W.,			
Sec. 20: NWNW	38.32	Yes	Yes

E East
N North
R Range
RMP Resource Management Plan
S South
Sec. Section
T Township
W West

[a] The number of lots indicates the number of parcels within the section; i.e., 2 parcels within this section.

Appendix M. Technical Support Document for Air Quality

M.1. Introduction

This technical support document summarizes the data, methodologies, and approaches followed in the analysis of air resources impacts that are included in Chapter 4 of the Buffalo Proposed Resource Management Plan (RMP) and Final Environmental Impact Statement (EIS). The analysis of impacts primarily involved the estimation of emissions from the various resource activities occurring in the planning area for the base year (2005) and for the alternatives in the future years (2015 and 2024).

M.2. Study Area

The study area for this analysis (Map 1) is the Buffalo planning area and the analysis includes consideration of cumulative emission sources and potential impacts to Class I areas within 150 kilometers of the area, as mandated by the Prevention of Significant Deterioration (PSD) program under the 1970 Clean Air Act (CAA). Although there are no Class I areas within the Buffalo planning area boundary or within the 150-kilometer range, this study included three Class I areas (Wind Cave National Park, Northern Cheyenne Indian Reservation, and Badlands Wilderness Area) that are within 150 kilometers.

M.3. Pollutants Addressed in the Analysis

The basic framework for controlling air pollutants in the United States is mandated by the CAA and its amendments, Environmental Protection Agency (EPA) regulations, including the 1999 Regional Haze Regulations, and state and local air quality regulations. The CAA addresses criteria air pollutants, state and NAAQS for criteria air pollutants, and the PSD program. The Regional Haze Regulations address visibility impairment. EPA regulations address ambient air quality standards for criteria pollutants, emission control technology, air quality monitoring, and State Implementation Plan development (which may include air quality modeling), and air quality related value (AQRV) analyses related to regional haze.

Air pollutants addressed in this study include criteria pollutants, hazardous air pollutants (HAPs), sulfur and nitrogen compounds (which could cause visibility impairment or atmospheric deposition impacts), and greenhouse gases (GHGs). These pollutants were included in this analysis because of the following: (1) they were identified as compounds that had potential to be emitted by management actions and activities, (2) adequate operational and activity data were available to estimate emissions, and (3) current emission factors were available to quantify emissions.

Criteria Pollutants

Criteria pollutants are those for which national standards of concentration have been established. Ambient air concentrations of these constituents greater than the standards represent a risk to human health. Criteria pollutants include carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur

dioxide (SO_2), ozone (O_3), particulate matter (PM_{10}, $PM_{2.5}$), and lead, each of which is listed below.

Carbon Monoxide. CO is an odorless, colorless gas formed during any combustion process, such as operation of engines, fireplaces, and furnaces. High concentrations of CO affect the oxygen-carrying capacity of the blood and can lead to unconsciousness and asphyxiation. Wildfires are natural sources of CO.

Nitrogen Dioxide. NO_2 is a red-brown gas formed during the operation of internal combustion engines or other burning processes. Such processes emit a mixture of nitrogen gases, collectively called nitrogen oxides (NO_X). NO_X can contribute to brown cloud conditions and can convert to ammonium nitrate particles and nitric acid, which can cause visibility impairment and acid rain. Bacterial action in soil can be a natural source of nitrogen compounds.

Sulfur Dioxide. SO_2 forms during combustion from trace levels of sulfur in coal or diesel fuel. It can convert to ammonium sulfate and sulfuric acid, which can cause visibility impairment and acid rain. Volcanoes are natural sources of SO_2. Anthropogenic sources include refineries and power plants.

Ozone. O_3 is a gas that generally is not emitted directly into the atmosphere, but is formed from NO_X and volatile reactive organic compound (VOC) emissions. As stated above, internal combustion engines are the main source of NO_X. VOCs, such as terpenes, are very reactive. Sources of VOCs include, but are not limited to, paint, varnish, and types of vegetation. The faint acrid smell common after thunderstorms is caused by O_3 formation caused by lightning. O_3 is a strong oxidizing chemical that can burn lungs and eyes, as well as damage plants.

Particulate Matter. Particulate matter (e.g., soil particles, hair, pollen) are essentially small particles suspended in the air that settle to the ground slowly and may be re-suspended if disturbed. Separate allowable concentration levels for particulate matter are based on the relative size of the particle:

- PM_{10} particles, particles with diameters of less than 10 micrometers, are small enough to be inhaled and can cause adverse health impacts.
- $PM_{2.5}$ particles, particles with diameters of less than 2.5 micrometers, are so small that they can be drawn deeply into the lungs and cause serious health problems. Particles of this size also are the main cause of visibility impairment.

Lead. Before the widespread use of unleaded fuel in automobiles, lead particles were emitted from automobile tailpipes. Lead is not considered in this analysis because emissions of lead from projected activities would be negligible.

Hazardous Air Pollutants

Although HAPs, including N-hexane, ethylbenzene, toluene, xylene, formaldehyde, and benzene, do not have ambient air quality standards, the EPA has issued reference concentrations for evaluating the inhalation risk for cancerous and noncancerous health impacts, known as reference concentrations for chronic inhalation. The EIS associated with the Buffalo RMP is a National Environmental Policy Act (NEPA) document and not a regulatory document, but the Record of Decision is binding and a "public record" (see 40 Code of Federal Regulations [CFR] 1505.2). In addition, there are regulatory issues that should be taken into account in preparing this Proposed RMP and Final EIS and ensuing project-specific EISs. Actual regulation of HAPs is achieved through compliance with the applicable maximum achievable control technology (MACT) standards and not through ambient air quality standards. Regulatory agencies implement control through Section 112 programs, specifically Section 112(g) case-by-case MACT determinations based on 40 CFR Part 63, Subpart B, and Section 112(d) MACT emission standards.

HAP emissions are associated with industrial activities, such as oil and gas operations, refineries, paint shops, dry cleaning facilities, and woodworking shops. Because this analysis is qualitative, no specific analyses of either short- or long-term HAP impacts are made.

Atmospheric Deposition Constituents

Sulfur and nitrogen compounds that can be deposited in terrestrial and aquatic ecosystems include nitric acid, nitrate, ammonium, and sulfate. Nitric acid and nitrate are not emitted directly into the air, but form in the atmosphere from industrial and automotive emissions of NO_X. Sulfate is formed in the atmosphere from industrial emission of SO_2. Deposition of nitric acid, nitrate, and sulfate can adversely impact plant growth, soil chemistry, lichens, aquatic environments, and petroglyphs. Ammonium is primarily associated with feedlots and agricultural fertilization. Ammonium deposits can affect terrestrial and aquatic vegetation.

Greenhouse Gases

GHGs are pollutants that are effective in preventing heat from escaping the earth's atmosphere and have been attributed to altering components of the earth's climate. These include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Other identified GHGs, including hydroflourocarbons, perflourocarbons, and sulfur hexafluoride were not included in the analysis because proposed activities are not sources of these pollutants and emissions are expected to be insignificant or zero.

M.4. Thresholds of Significance

Criteria Pollutants

National Ambient Air Quality Standards (NAAQS) and Wyoming Ambient Air Quality Standards (WAAQS) are health-based standards that identify maximum limits for criteria air pollutant concentrations at all locations to which the public has access. The NAAQS and WAAQS are legally enforceable standards. Concentrations that are above the NAAQS and WAAQS represent a risk to human health and by law, require public safeguards be implemented. State standards must be at least as protective of human health as federal standards, and may be more restrictive than the federal standards as allowed by the CAA. The EPA has developed standards for each pollutant for a specific averaging time. Short averaging times (1, 8, and 24 hours) address short-term exposure, while the annual standards address long-term exposure.

Chapter 3 of the Proposed RMP and Final EIS presented the national primary air quality standards and the Wyoming primary air quality standards. Analyses of proposed alternatives for project-specific EISs compare cumulative concentrations of air pollutants to the NAAQS and WAAQS. The Bureau of Land Management (BLM) cannot authorize any activity that would not conform to all applicable local, state, tribal, and federal air quality laws, regulations, and standards.

Prevention of Significant Deterioration

The goal of the PSD program is to ensure that air quality in areas with clean air does not significantly deteriorate, while a margin for future industrial growth is maintained. Under

the PSD program, each area in the United States is classified by the air quality in that region according to the following system:

PSD Class I Areas. Areas with pristine air quality, such as wilderness areas, national parks, and some Native American reservations, are accorded the strictest protection. Only very small incremental increases in pollutant concentrations are allowed in order to maintain the very clean air quality in these areas.

PSD Class II Areas. Essentially, all areas that are not designated as Class I are designated as Class II. Moderate incremental increases in pollutant concentrations are allowed, although the concentrations are not allowed to reach the concentrations set by Wyoming and federal standards (WAAQS and NAAQS).

PSD Class III Areas. No areas have been designated yet as Class III. A larger incremental increase in pollutant concentrations would be allowed, up to the applicable WAAQS and NAAQS.

Table M.1, "Prevention of Significant Deterioration Increments" (p. 2242) provides the incremental increases allowed for specific pollutants in Class I and Class II areas.

Comparisons of potential PM_{10}, NO_2, and SO_2 concentrations with PSD increments are intended to evaluate a threshold of concern only and do not represent a regulatory PSD increment consumption analysis. Regulatory PSD increment consumption analyses are solely the responsibility of the State of Wyoming, which has been granted primacy (with EPA oversight) under the CAA. In project-specific EISs, the BLM does not expect that a PSD analysis will be performed; rather, the PSD standards are used as a reference only to give the public a better understanding of the level of potential impact.

Table M.1. Prevention of Significant Deterioration Increments

Pollutant	Averaging Period	PSD Increment – Class I (µg/m³)	PSD Increment – Class II (µg/m³)
Sulfur Dioxide (SO_2)	3 Hours	25	512
	24 Hours	5	91
	Annual	2	20
Particulate Matter (PM_{10})	24-Hours	8	30
	Annual	4	17
Nitrogen Dioxide (NO_2)	Annual	2.5	25
Carbon Monoxide (CO)	1-Hour	None	None
	8-Hours	None	None
Lead	3 months	None	None

Source: Wyoming DEQ 2004b

PSD Prevention of Significant Deterioration
µg/m³ micrograms per cubic meter

Hazardous Air Pollutants

Section 112 of the CAA lists more than 180 chemicals as HAPs. In addition, Sections 112 (d) and 112(g) require regulatory agencies to establish MACT Standards for sources that emit HAPs. Any source that emits or has the potential to emit 10 tons per year or more of any HAP or 25 tons per year or more of any combination of HAPs is considered a major source and will require a Title V,

Part 70, operating permit review and permit. In addition to MACT standards, EPA has listed (on its Air Toxics Database) Reference Exposure Levels (RELs) for many of the HAPs. RELs are defined as concentrations at or below which no adverse health effects are expected.

Visibility and Regional Haze

Visibility impairment in the form of regional haze obscures the clarity, color, texture, and form of what we see. Haze-causing pollutants (mostly fine particles) are directly emitted into the atmosphere or are formed when gases emitted into the air form particles as they are carried downwind. Emissions from human-caused and natural sources can be carried great distances, contributing to regional haze. Changes in visibility or regional haze are caused by fine particles and gases scattering and absorbing light. The current method for assessing impacts on visibility is described in the Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report—Revised 2010 and is hereafter referred to as the FLAG 2010 method (FLAG 2010). This method compares incremental changes in light extinction relative to estimated natural background to a 5% change in light extinction threshold and a 10% change in light extinction threshold. Using the 98th percentile values, a 5% change in light extinction (approximately equal to 0.5 deciview) is the threshold recommended in FLAG 2010 and is considered to contribute to regional haze visibility impairment. A 10% change in light extinction (approximately equal to 1.0 deciview) is considered to cause visibility impairment when compared to background conditions.

Atmospheric Deposition

As described in the FLAG Phase I Report – Revised 2010 (NPS 2010), the National Park Service, the U.S. Forest Service, and the U.S. Fish and Wildlife Service (USFWS) have established thresholds to evaluate nitrogen and sulfur deposition within Class I areas. These deposition analysis thresholds are defined as 0.005 kilogram per hectare per year in the western United States for both nitrogen and sulfur. These thresholds are typically used to analyze impacts of individual projects. Cumulative impacts are typically compared to the level of concern, which is defined by the National Park Service and USFWS as 3 kilogram per hectare per year for nitrogen and 5 kilogram per hectare per year for sulfur in Rocky Mountain regions. Deposition rates that are below the level of concern are believed to cause no adverse impacts.

Lake Chemistry

The USFWS considers lake chemistry changes to be potentially significant if the screening methodology predicts decreases in acid neutralizing capacity (ANC) of more than defined limits of acceptable change (LAC). A lake's LAC depends on its background ANC value. The LAC is defined as a 10% change for lakes with ANC background values greater than 25 microequivalents per liter and is defined as a change of 1 microequivalents per liter for lakes with ANC background values less than 25 microequivalents per liter. If the ANC of a lake is predicted to decrease by more than the applicable LAC then potential changes to lake chemistry may cause adverse effects and a more detailed analysis of lake chemistry impacts would be required.

Emissions Generating Activities Included in the Analysis

Emissions of criteria pollutants and GHGs were estimated for 11 different types of management activities that were identified as having the potential to generate emissions of the specified

pollutants and for which activity, operation, and equipment data were available. In addition to these activities, emissions for **Coal Mining** operations in the planning area were also estimated using a different methodology (see below). The following is a list of the 11 sectors and the specific activities under each sector for which potential emissions were quantified:

Leasable Fluid Minerals – Conventional Natural Gas Development

Well pad and compressor station pad construction
Road construction and maintenance
Well drilling, completion, and testing
Well completion flares
Well workovers
Construction vehicle exhaust and fugitive dust
Maintenance vehicle exhaust and fugitive dust
Commuting vehicle exhaust and fugitive dust
Natural gas fired compressors
Dehydrator, separator, and water tank heaters
Dehydrator vents
Tank venting, flashing, and load-out
Wellhead equipment leaks
Pneumatic pumps and devices
Well pad and road reclamation
Wind erosion

Leasable Fluid Minerals – Coalbed Natural Gas Development

Well pad, compressor station pad, and water disposal well pad construction
Road construction and maintenance
Well drilling, completion, and testing
Well workovers
Construction vehicle exhaust and fugitive dust
Maintenance vehicle exhaust and fugitive dust
Commuting vehicle exhaust and fugitive dust
Natural gas fired compressors
Dehydrator and tank heaters
Dehydrator vents
Wellhead equipment leaks
Pneumatic pumps and devices
Well pad and road reclamation
Wind erosion
Produced water evaporation ponds

Leasable Fluid Minerals – Oil Development

Well pad and compressor station pad construction
Road construction and maintenance
Well drilling, completion, and testing
Well completion flares
Well workovers
Construction vehicle exhaust and fugitive dust
Maintenance vehicle exhaust and fugitive dust
Commuting vehicle exhaust and fugitive dust

Natural gas fired compressors
Dehydrator, separator, and water tank heaters
Dehydrator vents
Tank venting, flashing, and load-out
Wellhead equipment leaks
Pneumatic pumps and devices
Well pad and road reclamation
Wind erosion

Locatable Minerals – Bentonite Mining

Construction vehicle exhaust and fugitive dust
Maintenance vehicle exhaust and fugitive dust
Commuting vehicle exhaust and fugitive dust
Exploratory drilling
Exploratory excavation and reclamation
Mine development excavation and reclamation
Product handling, transfer, and storage

Locatable Minerals – Uranium Mining

Construction vehicle exhaust and fugitive dust
Maintenance vehicle exhaust and fugitive dust
Commuting vehicle exhaust and fugitive dust
Injection well, production well, and monitoring well construction
Well drilling and workovers
Road and pipeline construction
Road and well pad maintenance and reclamation
Transport of resin

Salable Minerals – Sand, Gravel, and other Mineral Development

Construction vehicle exhaust and fugitive dust
Maintenance vehicle exhaust and fugitive dust
Commuting vehicle exhaust and fugitive dust
Product handling, transfer, and storage
Wind erosion

Fire Management and Ecology – Prescribed Fire

Heavy equipment exhaust and fugitive dust
Commuting vehicle exhaust and fugitive dust
Mechanical equipment (chainsaws, etc.) exhaust
Smoke from prescribed fire

Forest Products

Heavy equipment and mechanical equipment exhaust and fugitive dust associated with tree harvesting, pole and post harvesting, firewood collection, tree salvaging, and weed control.
Commuting vehicle exhaust and fugitive dust

Land Resources– Rights-of-Way and Renewable Energy Projects

Heavy equipment and mechanical equipment exhaust and fugitive dust associated with the construction of wind energy projects, telephone and fiber optics sites, pipelines, roads, powerlines, and communication sites.

Commuting vehicle exhaust and fugitive dust

Land Resources – Travel and Transportation Management

Recreation trail and road maintenance
Off-highway vehicles

Land Resources – Livestock Grazing Management

Heavy equipment exhaust and fugitive dust associated with construction of springs, reservoirs, wells, pipelines, fences, and reservoir maintenance.
Commuting vehicle exhaust and fugitive dust
Enteric fermentation and manure

There were some management activities that emissions were not estimated for because development potential was low, emissions were considered to be minor, or insufficient data was available to calculate emissions. Emissions from the following management activities were not estimated because the potential for development was considered low: phosphate mining, oil shale development, geothermal development, gemstones and lapidary materials development. Emissions from the following management activities were not estimated because (1) the level of activity is not expected to change between alternatives, *and* (2) the magnitude of emissions from the activity is considered to be very small in comparison to other management activities, or (3) sufficient operational or production data were not available to quantify emissions: wildland (unplanned) fires, invasive species and pest management, grassland and shrubland management, wild horse management and activities related to heritage and visual resources, socioeconomic resources, and fish and wildlife resources.

M.5. Emissions Calculations

For this analysis, emissions of PM_{10}, $PM_{2.5}$, NO_X, SO_2, CO, VOC, HAPs, and GHGs were estimated for a 20-year period, beginning with 2005 as the base year, 2015 as the mid-point interim year, and 2024 as the end of this period. Emissions were estimated for the four alternatives: Alternative A (No Action Alternative), Alternative B (Resource Conservation), Alternative C (Resource Utilization), and Alternative D (Proposed RMP). Emissions were estimated for the base year 2005 corresponding to Alternative A while emissions for all alternatives were estimated for 2015 and 2024. A set of spreadsheets, originally developed for use in estimating emissions for the Lander RMP revision (BLM 2013g), were updated and adapted for use in estimating emissions for the Buffalo planning area for these years. Emission factors used to estimate emissions for various categories were obtained from (1) the EPA NONROAD2008a Emissions Model (EPA 2008); (2) Wyoming Department of Environmental Quality (DEQ) best available control technology (BACT) levels for natural gas-fired internal combustion engines (Wyoming DEQ 2013c); (3) the EPA MOBILE6.2.03 mobile emissions factor model for on-road motor vehicles (EPA 2003), (4) EPA AP-42 Compilation of Air Pollutant Emissions Factors (EPA 1995), (5) the American Petroleum Institute (API) Compendium of GHG Emissions Estimation Methodologies for Oil and Natural Gas Industry (American Petroleum Institute 2009); (6) EPA State Inventory Tool Module (EPA 2011c), and (7) the Western Governors Association Western Regional Air Partnership (Western Regional Air Partnership 2005), (8) 40 CFR Part 98 - Subpart W, (9) Wyoming DEQ Guidance on Oil and Gas Production Facilities (2013), and (10) EPA's National Emission Inventory (NEI) (EPA 2013b). Information regarding equipment types, numbers, activity, etc., was provided by specialists in the BLM BFO for some of the resources and information included in the *Surface Disturbance and Reasonable Foreseeable Action (RFA)* tables (Appendix G (p. 1937)) for the

planning area. Emissions estimates for coal mining activities were estimated using emission estimates contained in the 2008 version of EPA's NEI (EPA 2011b) and information contained in the latest version of the Mineral Occurrence Report for the planning area (BLM 2009c).

When reviewing the emission inventory, it is important to understand that assumptions were made regarding development. For example, there is uncertainty regarding ultimate development of energy resources (e.g., number of wells, equipment used, specific locations of wells, etc.). In general, the assumptions that were made would tend to result in a conservatively high estimate of emissions. For instance, given the number of sources included in this analysis, the likelihood that all emission sources would actually operate at their reasonable, foreseeable maximum emission rates over an entire year (or even 24 hours) is small. Also, depending on future economic conditions, mining and drilling methods, air pollution control technologies, and other factors that influence the pace of development, actual future emissions could be considerably different than presented. In addition, the size, location, and pace of development for future projects are not well known at this planning stage. For these reasons, it was determined that air quality modeling would not be included in this analysis. (A summary discussion of air quality modeling that has been and is being conducted in the planning area, primarily focused on the impacts of coal mining in the Powder River Basin, is provided in the *Air Quality* section in Chapter 3). As part of the NEPA analysis for actual development projects, the BLM will conduct an air quality analysis that will include air dispersion modeling of both project and cumulative impacts for those projects that may have a significant impact on air quality within the planning area.

A summary of total emissions for each pollutant species from all BLM activities is presented in Chapter 4, *Air Quality* section. Detailed emission totals for each category/planning year are presented at the end of this section.

Assumptions Used in Developing Emissions for the Buffalo RMP

The following assumptions were used in the emission calculations:

- All emission sources operated at their reasonably foreseeable maximum emission rates (as identified in the other resource sections of this document) simultaneously throughout the area.
- Induced or secondary growth related to increases in vehicle miles traveled is not included in the emissions inventory. Only activities directly related to BLM actions are considered.
- Stationary sources associated with oil and gas development would operate at emission levels based on currently observed BACT levels, and compressor stations for natural gas would be equipped with nonselective catalytic reduction catalyst. Also, it is assumed that conventional natural gas well fields would use gas gathering systems and process gas through centralized dehydration units.
- Activity data associated with management activities other than those related to conventional natural gas wells were averaged over the entire analysis period to produce annual average emissions, except for renewable energy development, where the single development activity was assumed to occur in one year (2015).
- EPA off-road emission standards were used to estimate emissions for non-road sources in project years 2005, 2015, and 2024. This approach simulates the replacement of existing sources by new lower-emitting equipment with future EPA off-road engine emission standards.
- Use of water application as a Best Management Practice would reduce fugitive dust emissions from ground-disturbing activities during construction and reclamation activities and maintenance of roads at project sites by 50% from uncontrolled levels.

Detailed descriptions for emissions estimation for each activity follow. Individual tables of air emissions for all BLM activities were calculated in spreadsheets for each activity.

Emissions Calculations by Category

Leasable Fluid Minerals – Conventional Oil, Natural Gas and Coalbed Natural Gas Development

The basis for emission calculations for conventional oil and gas development is Table G.1, "RFA-1A Reasonable Foreseeable Development Assumptions: Oil and Gas" (p. 1938) in Appendix G (p. 1937). However the values reported in Table G.1, "RFA-1A Reasonable Foreseeable Development Assumptions: Oil and Gas" (p. 1938) represented the combined totals for conventional Oil and Gas wells. For the calculations, the values in Table G.1, "RFA-1A Reasonable Foreseeable Development Assumptions: Oil and Gas" (p. 1938) were proportioned per the directive of the Buffalo Field Office (BFO) resource specialist and it was assumed that conventional oil wells represent 91% of the total wells and natural gas wells represented 9% of the total. Table M.2, "Number of Existing and Proposed Wells by Alternative" (p. 2248) presents the number and types of wells for each alternative on federal land as well as the cumulative totals on all lands (private, state, federal).

Table M.2. Number of Existing and Proposed Wells by Alternative

Alternative	Conventional Oil Wells Federal	Conventional Oil Wells Cumulative	Conventional NG Wells Federal	Conventional NG Wells Cumulative	CBNG wells Federal	CBNG wells Cumulative
Existing	1,992	4,133	197	372	9,211	26,064
Year 2015						
Alternative A	2,381	4,629	235	458	4,900	11,111
Alternative B	1,593	3,842	158	380	4,639	11,373
Alternative C	2,451	3,699	242	465	6,328	9,684
Alternative D	2,357	4,606	233	456	3,444	10,518
Year 2024						
Alternative A	2,769	5,497	274	544	589	3,842
Alternative B	1,195	3,923	118	388	66	3,319
Alternative C	2,909	5,637	288	558	3,444	6,697
Alternative D	2,723	5,451	269	539	1,775	5,028

Source: Appendix G (p. 1937)

CBNG coalbed natural gas
NG natural gas

The following list identifies the assumptions and sources of information used in the calculations of emissions for conventional oil, natural gas and coalbed natural gas development:

- Per well production information for conventional oil and gas wells were determined from the Powder River Basin Revised Projected "Oil" Production and Powder River Basin Revised Projected "Gas" Production tables revised August 16, 2010. Again per the BLM BFO resource specialist, 2% of the "oil" production is actually condensate and that along with what was in the "Gas" tables represents natural gas; 98% of the oil production is "just oil" and used for conventional oil computations.
- Emission factors for drill rig engines, diesel powered heavy (construction) equipment, generator engines, and other oil field equipment were obtained from EPA NONROADS 2008a Emissions Model.

- Emission factors for natural gas fired compressor engines were based on New Source Performance Standards Emission Standards for Spark Ignition Engines 40 CFR Part 60 JJJJ, recent BACT determinations by Wyoming DEQ, EPA's AP-42 Compilation of Air Pollutant Emission Factors (EPA 1995), and API Compendium of GHG Emissions Estimation Methodologies for the Oil and Natural Gas Industry (EPA 2006).
- Emission factors for on-road vehicles were obtained from EPA's MOBILE6.2 Motor Vehicle Emission Factor Model (EPA 2003),
- Emission factors for VOC and HAP emissions oil and gas sources were based on EPA's AP-42, EPA's Protocol for Equipment Leak Emissions Estimates (EPA 1995), GRI GLYCalc 4.0 emissions estimating software, EPA's Natural Gas STAR Program (http://www.epa.gov/gasstar/documents/ll_pneumatics.pdf), Wyoming DEQ's Oil and Gas Production Facilities Permitting Guidance, Chapter 6, Section 2 revised March 2010 (Wyoming DEQ 2010), and field gas analyses from the Lander Planning area (BLM 2013k).
- Activity and equipment data were obtained from resource specialists in the BFO, existing operator experience from producing fields in the Buffalo planning area, and professional judgment.

Emissions were estimated for produced water evaporation ponds based on several sources of information. Thoma (2009) reports both emission rates from evaporation ponds and concentrations in pond water. A mass balance calculation based on a methodology presented by the Colorado Department of Public Health and Environment (CDPHE 2007) was also used. Thoma (2009) reports results of measurements of pollutant fluxes from ponds at two facilities in western Colorado. One facility (Williams) includes a skim pond that holds produced water temporarily. The produced water is later transferred to an evaporation pond. The other facility (EnCana) includes only an evaporation pond. Thoma reports emission rates for some individual species such as benzene, toluene, xylene, and CH_4. Emissions for these species were used to calculate a ratio of the reported alkane (which was equivalenced to VOC) emissions to the sum of the individual species emissions. The ratio of CH_4 emissions to the sum of the individual species emissions was also calculated. These ratios are 1.888 and 0.395 for VOC and CH_4, respectively.

Thoma reports the concentrations of several species in the pond water and for our emissions estimates, mid-range values were used. Using a mass balance calculation as outlined in the Colorado Department of Public Health and Environment report (CDPHE 2007), the concentrations were used to calculate emissions rates. The mass balance calculation simply uses the concentration in the produced water multiplied by the volume of produced water with appropriate unit conversions to obtain an emission rate. The ratio of VOC to the sum of the individual species mass was used to obtain an emission rate for VOC. Similarly, an emission rate for CH_4 was obtained using the ratio of CH_4 to the sum of individual species emissions. Per well emission rates were estimated for these species using the current volume of produced water of 80,000 acre-feet per year, and, for the per-well calculations, 10 gallons per minute per well was assumed. This information was provided by the BLM. The calculated rates are presented in Table M.3, "Estimated Emissions Rates for Hydrocarbon Species from Produced Water Evaporation Ponds" (p. 2249). Multiplying these per well emission rates times the number of wells provides an estimate of evaporative pond emissions for hydrocarbons.

Table M.3. Estimated Emissions Rates for Hydrocarbon Species from Produced Water Evaporation Ponds

Species	Current Emissions (kilograms/year)	Emissions per well (kilograms/year)
Benzene	588,575	118
Toluene	1,354,307	273

Species	Current Emissions (kilograms/year)	Emissions per well (kilograms/year)
m,p-xylene	785,809	158
Volatile Organic Compounds	5,151,915	1,038
Methane	1,077,842	217
Source: CDPHE 2007		

Leasable Solid Minerals – Coal Mining

Criteria pollutant emissions for NO_X, SO_2, CO, PM_{10}, and $PM_{2.5}$ from coal mining activities in the planning area for the base year were obtained from EPA's NEI 2008 emission inventory (EPA 2011a). The information contained in this inventory was originally prepared for the entire state by Wyoming DEQ and submitted to EPA for inclusion in the NEI. Activities for which emissions are provided include mining, cleaning, and material handling processes. Estimates for VOCs and HAPs emissions are not available for coal mining activities in the NEI. To estimate emissions related to coal mining activities in the Buffalo planning area (Campbell, Sheridan, and Johnson Counties) for the future years (2015 and 2024), existing emissions estimates for 2008 were used along with estimates of future coal production in the Final Mineral Occurrence and Development Potential Report (BLM 2009c). In reviewing the NEI, all source category codes related to mining activity were selected and reviewed to consider whether they were related to coal mining activities. Using the list of coal related source category codes, emissions information for 2008 from the NEI were extracted for all three counties. Only Campbell County included emissions identified as coal related, since Campbell County includes the majority of the known coal deposits in the Powder River Basin, there is limited coal mining in Sheridan County, and no coal mining in Johnson County.

To project to the future years, the annual coal production estimates from the Mineral Occurrence Report were used. These include 381 million tons for 2008, 461 million tons for 2015, and 489 million tons for 2024. As an example, for NO_X, coal related emissions in Campbell County are 509 tpy in the 2008 NEI and coal production from the Mineral Report is 381 million tons. Taking the ratio of these two values gives 1.33 tpy of NO_X emission per million tons of coal production. Coal production in Campbell County in 2015 is estimated to be 461 million tons. Using the emissions ratio for NO_X, the estimated emissions for Campbell County for 2015 is 618 tpy. Since the NEI does not include coal mining emissions information for Sheridan County, it is assumed that the same ratio holds. Using the estimated coal production for Sheridan County in 2015 of 9 million tons, estimated NO_X emissions are therefore 12 tpy. Although the Mineral Occurrence Report includes low and high estimates for coal production in the area, the estimates are not very different and thus emissions for different alternatives, presented for all of the other managed resources, are not available for coal.

To estimate GHGs for coal mining activities, EPA's State Inventory Tool Module (EPA 2011c) was used. This tool provides estimates of CH_4 emissions from surface and underground mines for mining and post-mine (processing) activities in the Powder River Basin of Wyoming. The coal production numbers for planning area (above) were used to derive CH_4 and CO_2 equivalent emissions for coal mining activity.

Locatable Minerals – Bentonite Mining

Emissions estimates for future bentonite mining were based on operating data from the two existing bentonite mines in the Buffalo planning area (Petersen Draw and Mayoworth) and current authorized bentonite plans summarized in the Mineral Occurrence and Development Potential Report (June 2009), and updated through June 2010. In addition, input from the BLM

BFO resource specialist was considered. Emission factors for this category were obtained from EPA's AP-42 (EPA 1995), EPA's NONROADS 2008a Emissions model (EPA 2008), EPA's MOBILE6.2 motor vehicle emission factor model (EPA 2003), and API Compendium of GHG Emissions Estimation Methodologies for the Oil and Natural Gas Industry (American Petroleum Institute 2009).

Locatable Minerals – Uranium Mining

Emission estimates for future uranium mining were based on the three active uranium mines in the Buffalo area as well as current authorized and pending uranium plans of operations within the Buffalo planning area summarized in BFO Mineral Occurrence and Development Potential Report (June 2009), and updated through June 2010. In addition, input from the BLM BFO resource specialist was considered. It was assumed that all future uranium mining will utilize in-situ recovery rather than open-pit mining. Future emissions were based on the assumption that by 2013 Buffalo would have 2 operating in situ recovery mines (Willow Creek and Nichols Ranch/Hank) plus one still inactive mine (Ruth). Emission factors for this category were obtained from EPA's AP-42 (EPA 1995), EPA's NONROADS 2008a Emissions model (EPA 2008), EPA's MOBILE6.2 motor vehicle emission factor model (EPA 2003), and API Compendium of GHG Emissions Estimation Methodologies for the Oil and Natural Gas Industry (American Petroleum Institute 2009).

Salable Minerals – Sand, Gravel, and other Mineral Development

Emissions were estimated for this category primarily for sand and gravel sales using existing (June 2010) data, plus estimated future activity based outlined in Table G.2, "RFA-1B Reasonable Foreseeable Development Assumptions: Other Resource Uses" (p. 1942) of Appendix G (p. 1937). Existing emission calculations were based on current June 2010 data. Future emissions were calculated using estimated tons of material to be processed for each alternative. Emission factors for this category were obtained from EPA's AP-42 (EPA 1995), EPA's NONROADS 2008a Emissions model (EPA 2008), and EPA's MOBILE6.2 motor vehicle emission factor model (EPA 2003).

Fire Management and Ecology – Prescribed Fire

Emission estimates for fire management were based on the number of acres of disturbance projected for each alternative for prescribed burning. Per BLM resource staff, no mechanical fire treatments were included. Buffalo emissions factors for mechanical treatments (heavy equipment, all-terrain vehicles, and chain saws) were obtained from EPA's NONROADS 2008a emissions model (EPA 2008) and emission factors for commuting vehicles were obtained from EPA's MOBILE6.2 motor vehicle emission factor model (EPA 2003). Emission factors for PM_{10}, $PM_{2.5}$, NO_X, SO_2, CO, VOCs, CH_4, and N_2O from smoke were obtained from the 2008 FETS Emissions Data provided by Wyoming DEQ for Campbell and Johnson counties (Western Regional Air Partnership 2008). No fire data were reported for Sheridan County.

Forest Products

Emissions for this category were estimated using values provided in Table G.2, "RFA-1B Reasonable Foreseeable Development Assumptions: Other Resource Uses" (p. 1942) of Appendix G (p. 1937). In addition, input was provided by the BLM resource specialist. Invasive species treated by prescribed fire in other areas were included in this category because they are now chemically treated. Emission factors for this category were obtained from EPA's AP-42

(EPA 1995), EPA's NONROADS 2008a Emissions model (EPA 2008), EPA's MOBILE6.2 motor vehicle emission factor model (EPA 2003), the User's Guide: Emission Control Technologies and Emission Factors for Unpaved Road Fugitive Emissions (EPA 1987) and API Compendium of GHG Emissions Estimation Methodologies for the Oil and Natural Gas Industry (EPA 2003).

Land Resources – Rights-of-Way and Corridors and Renewable Energy Projects

Emissions were estimated for this category for several surface disturbing projects under Land resources. Table M.4, "Basis for Emissions Calculations for Land Resource Projects in the Buffalo Planning Area" (p. 2252) shows the key criteria projected under each alternative that were used to as the basis for emissions calculations. Note that there were zero acres estimated for telephone and fiber optics projects, so this disturbance was not included in the table. Emission factors for surface-disturbing activities were obtained from EPA's AP-42 (EPA 1995). Emission factors for heavy equipment used in these activities were obtained from EPA's NONROADS 2008a emissions model (EPA 2008) and emission factors for commuting vehicles were obtained from EPA's MOBILE6.2 motor vehicle emission factor model (EPA 2003).

Table M.4. Basis for Emissions Calculations for Land Resource Projects in the Buffalo Planning Area

Type of Project	Alternative A	Alternative B	Alternative C	Alternative D
Wind energy projects - acres of disturbance for planning area (over 20 years)	20,000	5,000	40,000	75,000
Wind energy projects - number of met towers	200	50	200	80
Pipelines projects - acres of disturbance/year	1,400	400	2,000	1,400
Roads (non-mineral) projects - acres of disturbance/year	6,275	2,090	8,364	6,275
Powerline projects - acres of disturbance/year	3,600	1,546	4,400	3,600
Communication sites - acres of disturbance/year	28	5	38	28
Source: Appendix G (p. 1937)				

Per BLM resource specialists, the following were assumed:

- one activity equals one site equals 1,000 acres for wind disturbance
- one activity equals one site equals 1 acre for met towers
- one activity equals 1.91 acres per mile for pipelines
- one activity equals 3.637 acres per mile for roads and powerlines
- one activity equals one site equals one acre for communication sites

Land Resources – Travel and Transportation Management

Emission sources under this category include activities at the only two recreation areas to accommodate off-highway vehicle (OHV) use (Middle Fork and Weston Hills) that the BFO manages. Emissions do not include the hundreds of miles of routes on BLM-administered lands without rights-of-way that the BLM might maintain less regularly. Based on the transportation

and access for recreation for Buffalo (per BLM specialist A. Barnes), maintenance occurs almost exclusively in the summer months. No roads are plowed during winter months and therefore winter activities were set to zero. Emission factors for heavy equipment used in these activities were obtained from EPA's NONROADS 2008a emissions model (EPA 2008) and emission factors for commuting vehicles were obtained from EPA's MOBILE6.2 motor vehicle emission factor mode (EPA 2003). OHV emissions were estimated using EPA's NONROADS 2008a emissions model (EPA 2008) which calculated annual emissions based on EPA's National Emissions Inventory and county population for 2005. Emissions were then projected for 2015, and 2024. Emission factors for surface-disturbing activities were obtained from EPA's AP-42 (EPA 1995).

Land Resources – Livestock Grazing Management

Emissions were estimated for six construction activities related to livestock grazing: springs, wells, fence, reservoir, and pipeline construction and reservoir maintenance. Emission estimates for these activities were based on the number of acres of disturbance projected for each activity under alternative provided in Table G.3, "RFA-2 Summary of Projected Acres of Surface Disturbance by Resource" (p. 1946) of Appendix G (p. 1937). In addition, CH_4 emissions related to animal enteric fermentation and manure deposits were calculated for estimated head of cattle, sheep, and horses projected for each alternative based on current livestock grazing permits. Emission factors for heavy equipment used in these activities were obtained from EPA's NONROADS 2008a emissions model (EPA 2008) and emission factors for commuting vehicles were obtained from EPA's MOBILE6.2 motor vehicle emission factor model (EPA 2003). Emission factors for enteric fermentation and manure management were obtained from Intergovernmental Panel on Climate Change Guidelines for National GHG Inventories (Intergovernmental Panel on Climate Change 2006).

M.6. Summary of Emissions for All BLM Activities

The following tables summarize the projected total annual emissions for each alternative by resource for the years 2005, 2015, and 2024.

Table M.5. Total Annual Emissions from Natural Gas Wells - Year 2005 - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO2**	**CO**	**VOC**	**HAPs[a]**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2e-qmetric Tonnes**
Well Pad & Station Construction - Fugitive Dust	3	0	---	---	---	---	---	---	---		---	---
Heavy Equipment Combustive Emissions[a]	0	0	0	0	0	0	0	39	0	0.00	39	36
Well Completion Flaring	0	0	0	0	0	0	0	0	0	0.00	0	0
Commuting Vehicles - Construction	0	0	0	0	0	0	0	2	0		2	2
Wind Erosion	0	0	---	---	---	---	---	---	---		---	---
Sub-total: Construction	4	0	0	0	0	0	0	41	0	0.00	41	37
Natural Gas Compression - Operations[a]	3	3	95	0	48	48	14	37,966	79	0.34	39,739	36,119

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO2**	**CO**	**VOC**	**HAPs[a]**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2e-qmetric Tonnes**
Separator, Dehydrator & Water Tank Heaters - Operations[a]	0	0	0	0	0	0	0	19	0	0.00	19	17
Dehy venting and flashing	---	---	---	---	---	6	2	60	4		137	132
Station Visits - Operations	7	1	0	0	0	0	0	25	0		25	23
Well Workover - Operations	0	0	0	0	0	0	0	0	0	0.00	0	0
Well & Pipeline visits for Inspection & Repair - Operations	6	1	0	0	0	0	0	11	0		11	10
Tanks Condensate and Loadout	---	---	---	---	---	1	0	0	0		3	3
Wellhead Fugitives	---	---	---	---	---	93	9	55	853		17,961	17,956
Pneumatic Devices	---	---	---	---	---	68	7	40	626		13,191	13,187
	7	0	0	0	0	0	0	18	0		18	16
Sub-total: Operations	24	5	95	0	48	216	33	38,193	1,562	0.34	71,103	67,462

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO2**	**CO**	**VOC**	**HAPs[a]**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2e-qmetric Tonnes**
Road Maintenance	0	0	0	0	0	0	0	13	0		13	12
Sub-total: Maintenance	0	0	0	0	0	0	0	13	0	0.00	13	12
Road Reclamation	0	0	0	0	0	0	0	0	0		0	0
Well Reclamation	0	0	0	0	0	0	0	8	0		8	7
Sub-total: Reclamation	0	0	0	0	0	0	0	8	0	0.00	8	8
Total Emissions	28	5	96	0	48	216	33	38,256	1,562	0.34	71,166	67,519

[a] HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately

Table M.6. Total Annual Emissions from Natural Gas Wells - Year 2015 - Alternative A - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	2	2	37	1	10	3	0	4,272	0	0.04	4,286	3,877
Well Completion Flaring	0	0	0	0	0	2	0	0	0	0.00	0	0
Commuting Vehicles - Construction	8	1	0	0	0	0	0	43	0		43	39
Wind Erosion	2	0	---	---	---	---	---	---	---	---	---	---
Sub-total: Construction	18	4	37	1	10	5	0	4,315	0	0.04	4,329	3,917
Natural Gas Compression - Operations a	4	4	114	0	57	57	17	45,374	95	0.41	47,493	43,167

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	22	0	0.00	22	20
Dehy venting and flashing	---	---	---	---	---	7	2	72	4		164	157
Station Visits - Operations	9	1	0	0	0	0	0	30	0		30	27
Well Workover - Operations	0	0	1	0	0	0	0	87	0	0.00	87	79
Well & Pipeline visits for Inspection & Repair - Operations	7	1	0	0	0	0	0	13	0		13	12
Tanks Condensate and Load-out	---	---	---	---	---	1	0	0	0		4	4
Wellhead Fugitives	---	---	---	---	---	111	11	65	1,019		21,465	21,459
Pneumatic Devices	---	---	---	---	---	82	8	48	748		15,765	15,760
	8	1	0	0	0	0	0	21	0		21	19
Sub-total: Operations	28	6	115	0	58	258	39	45,732	1,867	0.41	85,064	80,705

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Maintenance	0	0	0	0	0	0	0	15	0		15	14
Sub-total: Maintenance	0	0	0	0	0	0	0	15	0	0.00	15	14
Road Reclamation	0	0	0	0	0	0	0	0	0		0	0
Well Reclamation	0	0	0	0	0	0	0	10	0		10	9
Sub-total: Reclamation	0	0	0	0	0	0	0	10	0	0.00	10	9
Total Emissions	47	10	152	1	68	262	39	50,073	1,867	0.45	89,419	84,644
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.7. Total Annual Emissions from Natural Gas Wells - Year 2024 - Alternative A - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricTonnes**
Well Pad & Station Construction - Fugitive Dust	6	1	---	---	---	---	---	---	---		---	---
Heavy Equipment Combustive Emissions a	2	2	37	1	10	3	0	4,272	0	0.04	4,286	3,877
Well Completion Flaring	0	0	0	0	0	2	0	0	0	0.00	0	0
Commuting Vehicles - Construction	8	1	0	0	0	0	0	43	0		43	39
Wind Erosion	2	0	---	---	---	---	---	---	---		---	---
Sub-total: Construction	18	4	37	1	10	5	0	4,315	0	0.04	4,329	3,917
Natural Gas Compression - Operations a	5	5	132	0	66	66	20	52,780	110	0.48	55,245	50,212

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	26	0	0.00	26	23
Dehy venting and flashing	---	---	---	---	---	6	2	61	4		138	133
Station Visits - Operations	10	1	0	0	1	0	0	35	0		35	32
Well Workover - Operations	0	0	1	0	0	0	0	87	0	0.00	87	79
Well & Pipeline visits for Inspection & Repair - Operations	9	1	0	0	0	0	0	15	0		15	13
Tanks Condensate and Loadout	---	---	---	---	---	1	0	0	0		4	4
Wellhead Fugitives	---	---	---	---	---	129	13	76	1,185		24,969	24,962
Pneumatic Devices	---	---	---	---	---	95	9	56	871		18,338	18,333
	10	1	0	0	0	0	0	25	0		25	22
Sub-total: Operations	33	7	133	0	67	297	44	53,160	2,170	0.48	98,881	93,813

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Maintenance	1	0	0	0	0	0	0	18	0		18	16
Sub-total: Maintenance	1	0	0	0	0	0	0	18	0	0.00	18	16
Road Reclamation	0	0	0	0	0	0	0	0	0		0	0
Well Reclamation	0	0	0	0	0	0	0	11	0		11	10
Sub-total: Reclamation	0	0	0	0	0	0	0	12	0	0.00	12	10
Total Emissions	52	11	170	1	78	302	45	57,505	2,170	0.52	103,240	97,757
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.8. Total Annual Emissions from Natural Gas Wells - Year 2015 - Alternative B - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	0	0	0	0	0	0	0	50	0	0.00	50	46
Well Completion Flaring	0	0	0	0	0	0	0	0	0	0.00	0	0
Commuting Vehicles - Construction	0	0	0	0	0	0	0	2	0		2	2
Wind Erosion	0	0	---	---	---	---	---	---	---	---	---	---
Sub-total: Construction	3	0	0	0	0	0	0	52	0	0.00	53	48
Natural Gas Compression - Operations a	3	3	76	0	38	38	11	30,371	64	0.27	31,789	28,893

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	15	0	0.00	15	13
Dehy venting and flashing	---	---	---	---	---	4	2	48	3		110	105
Station Visits - Operations	6	1	0	0	0	0	0	20	0		20	18
Well Workover - Operations	0	0	0	0	0	0	0	0	0	0.00	0	0
Well & Pipeline visits for Inspection & Repair - Operations	5	0	0	0	0	0	0	9	0		9	8
Tanks Condensate and Load-out	---	---	---	---	---	1	0	0	0		3	3
Wellhead Fugitives	---	---	---	---	---	74	7	44	682		14,368	14,364
Pneumatic Devices	---	---	---	---	---	55	5	32	501		10,552	10,549
	6	1	0	0	0	0	0	14	0		14	13
Sub-total: Operations	19	4	76	0	39	172	26	30,553	1,250	0.27	56,879	53,967

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Maintenance	0	0	0	0	0	0	0	10	0		10	9
Sub-total: Maintenance	0	0	0	0	0	0	0	10	0	0.00	10	9
Road Reclamation	0	0	0	0	0	0	0	0	0		0	0
Well Reclamation	0	0	0	0	0	0	0	6	0		6	6
Sub-total: Reclamation	0	0	0	0	0	0	0	7	0	0.00	7	6
Total Emissions	23	5	77	0	39	173	26	30,622	1,250	0.27	56,949	54,030
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.9. Total Annual Emissions from Natural Gas Wells - Year 2024 - Alternative B - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricTonnes**
Well Pad & Station Construction - Fugitive Dust	3	0	---	---	---	---	---	---	---		---	---
Heavy Equipment Combustive Emissions a	0	0	0	0	0	0	0	50	0	0.00	50	46
Well Completion Flaring	0	0	0	0	0	0	0	0	0	0.00	0	0
Commuting Vehicles - Construction	0	0	0	0	0	0	0	2	0		2	2
Wind Erosion	0	0	---	---	---	---	---	---	---		---	---
Sub-total: Construction	3	0	0	0	0	0	0	52	0	0.00	53	48
Natural Gas Compression - Operations a	2	2	57	0	29	29	9	22,774	48	0.20	23,837	21,666

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO_2eq	CO2eq-metricT-onnes
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	11	0	0.00	11	10
Dehy venting and flashing	---	---	---	---	---	2	1	26	2		60	57
Station Visits - Operations	4	0	0	0	0	0	0	15	0		15	14
Well Workover - Operations	0	0	0	0	0	0	0	0	0	0.00	0	0
Well & Pipeline visits for Inspection & Repair - Operations	4	0	0	0	0	0	0	6	0		6	6
Tanks Condensate and Loadout	---	---	---	---	---	1	0	0	0		2	2
Wellhead Fugitives	---	---	---	---	---	56	6	33	511		10,774	10,771
Pneumatic Devices	---	---	---	---	---	41	4	24	376		7,913	7,910
	4	0	0	0	0	0	0	11	0		11	10
Sub-total: Operations	14	3	57	0	29	128	19	22,900	936	0.21	42,629	40,445

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Maintenance	0	0	0	0	0	0	0	8	0		8	7
Sub-total: Maintenance	0	0	0	0	0	0	0	8	0	0.00	8	7
Road Reclamation	0	0	0	0	0	0	0	0	0		0	0
Well Reclamation	0	0	0	0	0	0	0	5	0		5	4
Sub-total: Reclamation	0	0	0	0	0	0	0	5	0	0.00	5	5
Total Emissions	18	4	58	0	29	128	19	22,966	936	0.21	42,694	40,505

[a] HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately

Table M.10. Total Annual Emissions from Natural Gas Wells - Year 2015 - Alternative C - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	2	2	40	1	11	3	0	4,646	0	0.05	4,662	4,217
Well Completion Flaring	0	0	0	0	0	2	0	0	0	0.00	0	0
Commuting Vehicles - Construction	8	1	0	0	0	0	0	47	0		47	42
Wind Erosion	2	0	---	---	---	---	---	---	---	---	---	---
Sub-total: Construction	19	4	40	1	11	5	1	4,693	0	0.05	4,709	4,260
Natural Gas Compression - Operations a	4	4	117	0	59	59	18	46,710	98	0.42	48,891	44,437

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricTonnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	23	0	0.00	23	21
Dehy venting and flashing	---	---	---	---	---	7	3	74	5		169	162
Station Visits - Operations	9	1	0	0	0	0	0	31	0		31	28
Well Workover - Operations	0	0	1	0	0	0	0	94	0	0.00	95	86
Well & Pipeline visits for Inspection & Repair - Operations	8	1	0	0	0	0	0	13	0		13	12
Tanks Condensate and Load-out	---	---	---	---	---	1	0	0	0		4	4
Wellhead Fugitives	---	---	---	---	---	114	11	67	1,049		22,097	22,091
Pneumatic Devices	---	---	---	---	---	84	8	49	770		16,229	16,224
	9	1	0	0	0	0	0	22	0		22	20
Sub-total: Operations	29	7	118	0	59	265	40	47,084	1,922	0.42	87,573	83,085

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO_2eq	CO2eq-metricT-onnes
Road Maintenance	0	0	0	0	0	0	0	16	0		16	14
Sub-total: Maintenance	0	0	0	0	0	0	0	16	0	0.00	16	14
Road Reclamation	0	0	0	0	0	0	0	0	0		0	0
Well Reclamation	0	0	0	0	0	0	0	10	0		10	9
Sub-total: Reclamation	0	0	0	0	0	0	0	10	0	0.00	10	9
Total Emissions	49	11	159	1	71	270	41	51,803	1,922	0.47	92,308	87,368
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.11. Total Annual Emissions from Natural Gas Wells - Year 2024 - Alternative C - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricTonnes**
Well Pad & Station Construction - Fugitive Dust	6	1	---	---	---	---	---	---	---		---	---
Heavy Equipment Combustive Emissions a	2	2	40	1	11	3	0	4,646	0	0.05	4,662	4,217
Well Completion Flaring	0	0	0	0	0	2	0	0	0	0.00	0	0
Commuting Vehicles - Construction	8	1	0	0	0	0	0	47	0		47	42
Wind Erosion	2	0	---	---	---	---	---	---	---		---	---
Sub-total: Construction	19	4	40	1	11	5	1	4,693	0	0.05	4,709	4,260
Natural Gas Compression - Operations a	5	5	139	0	69	69	21	55,451	116	0.50	58,041	52,754

Activity	Annual Emissions (Tons)											
	PM_{10}	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	27	0	0.00	27	25
Dehy venting and flashing	---	---	---	---	---	6	2	64	4		145	139
Station Visits - Operations	11	1	0	0	1	0	0	36	0		36	33
Well Workover - Operations	0	0	1	0	0	0	0	94	0	0.00	95	86
Well & Pipeline visits for Inspection & Repair - Operations	9	1	0	0	0	0	0	16	0		16	14
Tanks Condensate and Loadout	---	---	---	---	---	1	0	0	0		4	4
Wellhead Fugitives	---	---	---	---	---	136	14	80	1,245		26,233	26,225
Pneumatic Devices	---	---	---	---	---	100	10	59	915		19,266	19,261
	10	1	0	0	0	0	0	26	0		26	24
Sub-total: Operations	35	8	140	0	71	312	47	55,853	2,280	0.50	103,889	98,564

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Maintenance	1	0	0	0	0	0	0	19	0		19	17
Sub-total: Maintenance	1	0	0	0	0	0	0	19	0	0.00	19	17
Road Reclamation	0	0	0	0	0	0	0	0	0		0	0
Well Reclamation	0	0	0	0	0	0	0	12	0		12	11
Sub-total: Reclamation	0	0	0	0	0	0	0	12	0	0.00	12	11
Total Emissions	55	12	180	1	82	317	47	60,577	2,280	0.55	108,629	102,852

[a] HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately

Table M.12. Total Annual Emissions from Natural Gas Wells - Year 2015 - Alternative D - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	5	1	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	2	2	36	1	10	3	0	4,140	0	0.04	4,154	3,758
Well Completion Flaring	0	0	0	0	0	2	0	0	0	0.00	0	0
Commuting Vehicles - Construction	8	1	0	0	0	0	0	42	0		42	38
Wind Erosion	2	0	---	---	---	---	---	---	---	---	---	---
Sub-total: Construction	17	4	36	1	10	5	0	4,182	0	0.04	4,196	3,796
Natural Gas Compression - Operations a	4	4	113	0	56	56	17	44,932	94	0.40	47,030	42,746

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	22	0	0.00	22	20
Dehy venting and flashing	---	---	---	---	---	7	2	71	4		162	156
Station Visits - Operations	9	1	0	0	0	0	0	30	0		30	27
Well Workover - Operations	0	0	1	0	0	0	0	84	0	0.00	84	76
Well & Pipeline visits for Inspection & Repair - Operations	7	1	0	0	0	0	0	13	0		13	11
Tanks Condensate and Load-out	---	---	---	---	---	1	0	0	0		4	4
Wellhead Fugitives	---	---	---	---	---	110	11	65	1,009		21,256	21,250
Pneumatic Devices	---	---	---	---	---	81	8	48	741		15,611	15,607
	8	1	0	0	0	0	0	21	0		21	19
Sub-total: Operations	28	6	114	0	57	255	39	45,285	1,849	0.41	84,233	79,916

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Maintenance	0	0	0	0	0	0	0	15	0		15	14
Sub-total: Maintenance	0	0	0	0	0	0	0	15	0	0.00	15	14
Road Reclamation	0	0	0	0	0	0	0	0	0		0	0
Well Reclamation	0	0	0	0	0	0	0	10	0		10	9
Sub-total: Reclamation	0	0	0	0	0	0	0	10	0	0.00	10	9
Total Emissions	46	10	150	1	67	260	39	49,492	1,849	0.45	88,454	83,735
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.13. Total Annual Emissions from Natural Gas Wells - Year 2024 - Alternative D - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	5	1	---	---	---	---	---	---	---		---	---
Heavy Equipment Combustive Emissions a	2	2	36	1	10	3	0	4,140	0	0.04	4,154	3,758
Well Completion Flaring	0	0	0	0	0	2	0	0	0	0.00	0	0
Commuting Vehicles - Construction	8	1	0	0	0	0	0	42	0		42	38
Wind Erosion	2	0	---	---	---	---	---	---	---		---	---
Sub-total: Construction	17	4	36	1	10	5	0	4,182	0	0.04	4,196	3,796
Natural Gas Compression - Operations a	4	4	130	0	65	65	20	51,896	109	0.47	54,319	49,371

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO_2eq	CO2eq-metricT-onnes
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	25	0	0.00	25	23
Dehy venting and flashing	---	---	---	---	---	5	2	60	4		136	131
Station Visits - Operations	10	1	0	0	1	0	0	34	0		34	31
Well Workover - Operations	0	0	1	0	0	0	0	84	0	0.00	84	76
Well & Pipeline visits for Inspection & Repair - Operations	8	1	0	0	0	0	0	15	0		15	13
Tanks Condensate and Load-out	---	---	---	---	---	1	0	0	0		4	4
Wellhead Fugitives	---	---	---	---	---	127	13	75	1,166		24,551	24,544
Pneumatic Devices	---	---	---	---	---	93	9	55	856		18,031	18,026
	10	1	0	0	0	0	0	24	0		24	22
Sub-total: Operations	33	7	131	0	66	292	44	52,268	2,134	0.47	97,223	92,240

Activity	Annual Emissions (Tons)											
	PM_{10}	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Maintenance	1	0	0	0	0	0	0	18	0		18	16
Sub-total: Maintenance	1	0	0	0	0	0	0	18	0	0.00	18	16
Road Reclamation	0	0	0	0	0	0	0	0	0		0	0
Well Reclamation	0	0	0	0	0	0	0	11	0		11	10
Sub-total: Reclamation	0	0	0	0	0	0	0	11	0	0.00	11	10
Total Emissions	50	11	167	1	76	297	44	56,479	2,134	0.51	101,448	96,062

[a] HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately

Table M.14. Total Annual Emissions from Natural Gas Wells - Year 2005 - Cumulative Effects

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	6	1	---	---	---	---	---	---	---		---	---
Heavy Equipment Combustive Emissions a	0	0	1	0	0	0	0	73	0	0.00	73	67
Well Completion Flaring	0	0	0	0	0	0	0	0	0	0.00	0	0
Commuting Vehicles - Construction	1	0	0	0	0	0	0	14	0		14	13
Wind Erosion	0	0	---	---	---	---	---	---	---		---	---
Sub-total: Construction	7	1	1	0	0	0	0	87	0	0.00	87	79
Natural Gas Compression - Operations a	6	6	180	0	90	90	27	71,686	150	0.65	75,034	68,199

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricTonnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	70	0	0.00	70	63
Dehy venting and flashing	---	---	---	---	---	10	4	114	7		259	249
Station Visits - Operations	14	1	0	0	1	0	0	47	0		47	43
Well Workover - Operations	0	0	0	0	0	0	0	0	0	0.00	0	0
Well & Pipeline visits for Inspection & Repair - Operations	12	1	0	0	0	0	0	20	0		20	18
Tanks Condensate and Load-out	---	---	---	---	---	7	1	1	1		26	26
Wellhead Fugitives	---	---	---	---	---	176	18	103	1,610		33,913	33,904
Pneumatic Devices	---	---	---	---	---	129	13	76	1,182		24,907	24,900
	13	0	0	0	0	0	0	34	0		34	30
Sub-total: Operations	45	9	180	0	91	413	62	72,150	2,950	0.65	134,310	127,432

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Maintenance	1	0	0	0	0	0	0	24	0		24	22
Sub-total: Maintenance	1	0	0	0	0	0	0	24	0	0.00	24	22
Road Reclamation	0	0	0	0	0	0	0	1	0		1	0
Well Reclamation	1	0	0	0	0	0	0	15	0		15	14
Sub-total: Reclamation	1	0	0	0	0	0	0	16	0	0.00	16	14
Total Emissions	53	10	181	0	92	413	62	72,278	2,950	0.65	134,437	127,547
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.15. Total Annual Emissions from Natural Gas Wells - Year 2015 - Alternative A - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	11	1	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	4	4	75	2	20	6	1	8,643	0	0.09	8,672	7,845
Well Completion Flaring	0	0	0	0	0	4	0	0	0	0.00	0	0
Commuting Vehicles - Construction	16	2	1	0	1	0	0	160	0		160	145
Wind Erosion	4	1	---	---	---	---	---	---	---	---	---	---
Sub-total: Construction	35	7	75	2	21	9	1	8,803	0	0.09	8,832	7,990
Natural Gas Compression - Operations a	8	8	221	0	111	111	33	88,233	184	0.79	92,353	83,940

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	86	0	0.00	86	78
Dehy venting and flashing	---	---	---	---	---	13	5	140	9		319	306
Station Visits - Operations	17	2	0	0	1	0	0	58	0		58	53
Well Workover - Operations	0	0	1	0	0	0	0	176	0	0.00	176	160
Well & Pipeline visits for Inspection & Repair - Operations	14	1	0	0	0	0	0	25	0		25	23
Tanks Condensate and Loadout	---	---	---	---	---	9	1	1	2		32	32
Wellhead Fugitives	---	---	---	---	---	216	22	127	1,982		41,741	41,729
Pneumatic Devices	---	---	---	---	---	159	16	93	1,455		30,656	30,647
	16	2	0	0	0	0	0	41	0		41	38
Sub-total: Operations	55	12	223	1	112	508	76	88,980	3,631	0.80	165,488	157,006

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Maintenance	1	0	0	0	0	0	0	30	0		30	27
Sub-total: Maintenance	1	0	0	0	0	0	0	30	0	0.00	30	27
Road Reclamation	0	0	0	0	0	0	0	1	0		1	1
Well Reclamation	1	0	0	0	0	0	0	19	0		19	17
Sub-total: Reclamation	1	0	0	0	0	0	0	19	0	0.00	19	18
Total Emissions	92	20	299	2	133	517	77	97,832	3,632	0.88	174,369	165,040
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.16. Total Annual Emissions from Natural Gas Wells - Year 2024 - Alternative A - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	11	1	---	---	---	---	---	---	---		---	---
Heavy Equipment Combustive Emissions a	4	4	75	2	20	6	1	8,643	0	0.09	8,672	7,845
Well Completion Flaring	0	0	0	0	0	4	0	0	0	0.00	0	0
Commuting Vehicles - Construction	16	2	1	0	1	0	0	160	0		160	145
Wind Erosion	4	1	---	---	---	---	---	---	---		---	---
Sub-total: Construction	35	7	75	2	21	9	1	8,803	0	0.09	8,832	7,990
Natural Gas Compression - Operations a	9	9	262	1	131	131	39	104,780	219	0.94	109,673	99,682

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	102	0	0.00	102	93
Dehy venting and flashing	---	---	---	---	---	11	4	120	7		275	264
Station Visits - Operations	20	2	0	0	1	0	0	69	0		69	63
Well Workover - Operations	0	0	1	0	0	0	0	176	0	0.00	176	160
Well & Pipeline visits for Inspection & Repair - Operations	17	2	0	0	0	0	0	29	0		29	27
Tanks Condensate and Load-out	---	---	---	---	---	8	1	1	1		28	28
Wellhead Fugitives	---	---	---	---	---	257	26	151	2,353		49,569	49,555
Pneumatic Devices	---	---	---	---	---	188	19	111	1,728		36,405	36,395
	19	2	0	0	0	0	0	49	0		49	45
Sub-total: Operations	66	15	265	1	133	596	89	105,588	4,309	0.95	196,376	186,310

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Maintenance	1	0	0	0	0	0	0	36	0		36	32
Sub-total: Maintenance	1	0	0	0	0	0	0	36	0	0.00	36	32
Road Reclamation	0	0	0	0	0	0	0	1	0		1	1
Well Reclamation	1	0	0	0	0	0	0	22	0		22	20
Sub-total: Reclamation	1	0	0	0	0	0	0	23	0	0.00	23	21
Total Emissions	102	22	340	2	154	606	90	114,450	4,309	1.03	205,266	194,352
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.17. Total Annual Emissions from Natural Gas Wells - Year 2015 - Alternative B – Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH_4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	8	1	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	2	2	38	1	10	3	0	4,421	0	0.04	4,436	4,013
Well Completion Flaring	0	0	0	0	0	2	0	0	0	0.00	0	0
Commuting Vehicles - Construction	8	1	0	0	0	0	0	87	0		87	79
Wind Erosion	2	0	---	---	---	---	---	---	---	---	---	---
Sub-total: Construction	20	4	39	1	11	5	0	4,508	0	0.04	4,523	4,092
Natural Gas Compression - Operations a	6	6	183	0	92	92	28	73,230	153	0.66	76,650	69,667

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH_4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	71	0	0.00	72	65
Dehy venting and flashing	---	---	---	---	---	11	4	116	7		265	254
Station Visits - Operations	14	1	0	0	1	0	0	48	0		48	44
Well Workover - Operations	0	0	1	0	0	0	0	89	0	0.00	90	81
Well & Pipeline visits for Inspection & Repair - Operations	12	1	0	0	0	0	0	21	0		21	19
Tanks Condensate and Loadout	---	---	---	---	---	8	1	1	1		27	27
Wellhead Fugitives	---	---	---	---	---	179	18	106	1,645		34,643	34,634
Pneumatic Devices	---	---	---	---	---	132	13	78	1,208		25,443	25,436
	14	1	0	0	0	0	0	34	0		34	31
Sub-total: Operations	46	10	185	0	93	422	63	73,793	3,014	0.66	137,292	130,257

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH_4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Maintenance	1	0	0	0	0	0	0	25	0		25	23
Sub-total: Maintenance	1	0	0	0	0	0	0	25	0	0.00	25	23
Road Reclamation	0	0	0	0	0	0	0	1	0		1	0
Well Reclamation	1	0	0	0	0	0	0	16	0		16	14
Sub-total: Reclamation	1	0	0	0	0	0	0	16	0	0.00	16	15
Total Emissions	68	14	224	1	104	426	64	78,342	3,014	0.70	141,855	134,386
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.18. Total Annual Emissions from Natural Gas Wells - Year 2024 - Alternative B - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	8	1	---	---	---	---	---	---	---		---	---
Heavy Equipment Combustive Emissions a	2	2	38	1	10	3	0	4,421	0	0.04	4,436	4,013
Well Completion Flaring	0	0	0	0	0	2	0	0	0	0.00	0	0
Commuting Vehicles - Construction	8	1	0	0	0	0	0	87	0		87	79
Wind Erosion	2	0	---	---	---	---	---	---	---		---	---
Sub-total: Construction	20	4	39	1	11	5	0	4,508	0	0.04	4,523	4,092
Natural Gas Compression - Operations a	6	6	187	0	94	94	28	74,773	156	0.67	78,265	71,136

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	73	0	0.00	73	66
Dehy venting and flashing	---	---	---	---	---	8	3	86	5		196	188
Station Visits - Operations	14	1	0	0	1	0	0	49	0		49	45
Well Workover - Operations	0	0	1	0	0	0	0	89	0	0.00	90	81
Well & Pipeline visits for Inspection & Repair - Operations	12	1	0	0	0	0	0	21	0		21	19
Tanks Condensate and Load-out	---	---	---	---	---	6	1	0	1		20	20
Wellhead Fugitives	---	---	---	---	---	183	18	108	1,679		35,374	35,364
Pneumatic Devices	---	---	---	---	---	134	13	79	1,233		25,979	25,972
	14	1	0	0	0	0	0	35	0		35	32
Sub-total: Operations	47	11	189	0	95	425	63	75,314	3,075	0.67	140,102	132,922

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Maintenance	1	0	0	0	0	0	0	25	0		25	23
Sub-total: Maintenance	1	0	0	0	0	0	0	25	0	0.00	25	23
Road Reclamation	0	0	0	0	0	0	0	1	0		1	0
Well Reclamation	1	0	0	0	0	0	0	16	0		16	14
Sub-total: Reclamation	1	0	0	0	0	0	0	16	0	0.00	16	15
Total Emissions	69	15	227	1	106	430	64	79,864	3,075	0.72	144,667	137,052

[a] HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately

Table M.19. Total Annual Emissions from Natural Gas Wells - Year 2015 - Alternative C - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	11	1	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	4	4	78	2	21	6	1	9,017	0	0.09	9,047	8,184
Well Completion Flaring	0	0	0	0	0	4	0	0	0	0.00	0	0
Commuting Vehicles - Construction	16	2	1	0	1	0	0	166	0		166	151
Wind Erosion	4	1	---	---	---	---	---	---	---	---	---	---
Sub-total: Construction	36	8	79	2	22	10	1	9,183	0	0.09	9,213	8,335
Natural Gas Compression - Operations a	8	8	224	0	112	112	34	89,569	187	0.81	93,751	85,211

Activity	Annual Emissions (Tons)											
	PM_{10}	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	87	0	0.00	87	79
Dehy venting and flashing	---	---	---	---	---	13	5	142	9		324	311
Station Visits - Operations	17	2	0	0	1	0	0	59	0		59	53
Well Workover - Operations	0	0	1	0	0	0	0	184	0	0.00	184	167
Well & Pipeline visits for Inspection & Repair - Operations	15	1	0	0	0	0	0	25	0		25	23
Tanks Condensate and Loadout	---	---	---	---	---	9	1	1	2		33	33
Wellhead Fugitives	---	---	---	---	---	219	22	129	2,012		42,373	42,361
Pneumatic Devices	---	---	---	---	---	161	16	95	1,477		31,120	31,111
	17	2	0	0	0	0	0	42	0		42	38
Sub-total: Operations	56	13	226	1	114	516	78	90,332	3,686	0.81	167,998	159,387

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Maintenance	1	0	0	0	0	0	0	31	0		31	28
Sub-total: Maintenance	1	0	0	0	0	0	0	31	0	0.00	31	28
Road Reclamation	0	0	0	0	0	0	0	1	0		1	1
Well Reclamation	1	0	0	0	0	0	0	19	0		19	17
Sub-total: Reclamation	1	0	0	0	0	0	0	20	0	0.00	20	18
Total Emissions	94	20	305	2	136	526	79	99,565	3,687	0.90	177,262	167,767
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.20. Total Annual Emissions from Natural Gas Wells - Year 2024 - Alternative C - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	11	1	---	---	---	---	---	---	---		---	---
Heavy Equipment Combustive Emissions a	4	4	78	2	21	6	1	9,017	0	0.09	9,047	8,184
Well Completion Flaring	0	0	0	0	0	4	0	0	0	0.00	0	0
Commuting Vehicles - Construction	16	2	1	0	1	0	0	166	0		166	151
Wind Erosion	4	1	---	---	---	---	---	---	---		---	---
Sub-total: Construction	36	8	79	2	22	10	1	9,183	0	0.09	9,213	8,335
Natural Gas Compression - Operations a	9	9	269	1	135	135	40	107,451	225	0.97	112,469	102,224

Activity	Annual Emissions (Tons)											
	PM_{10}	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricTonnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	105	0	0.00	105	95
Dehy venting and flashing	---	---	---	---	---	11	4	124	8		282	270
Station Visits - Operations	20	2	0	0	1	0	0	71	0		71	64
Well Workover - Operations	0	0	1	0	0	0	0	184	0	0.00	184	167
Well & Pipeline visits for Inspection & Repair - Operations	17	2	0	0	0	0	0	30	0		30	27
Tanks Condensate and Load-out	---	---	---	---	---	8	1	1	1		29	29
Wellhead Fugitives	---	---	---	---	---	263	26	155	2,413		50,833	50,818
Pneumatic Devices	---	---	---	---	---	193	19	114	1,772		37,333	37,322
	20	2	0	0	0	0	0	50	0		50	46
Sub-total: Operations	67	15	271	1	137	611	91	108,283	4,419	0.97	201,385	191,062

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO_2eq	CO2eq-metricT-onnes
Road Maintenance	1	0	0	0	0	0	0	37	0		37	33
Sub-total: Maintenance	1	0	0	0	0	0	0	37	0	0.00	37	33
Road Reclamation	0	0	0	0	0	0	0	1	0		1	1
Well Reclamation	1	0	0	0	0	0	0	23	0		23	21
Sub-total: Reclamation	1	0	0	0	0	0	0	23	0	0.00	24	21
Total Emissions	105	23	350	2	159	621	92	117,526	4,419	1.06	210,659	199,452

[a] HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately

Table M.21. Total Annual Emissions from Natural Gas Wells - Year 2015 - Alternative D - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricTonnes**
Well Pad & Station Construction - Fugitive Dust	11	1	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	4	4	73	2	20	5	1	8,516	0	0.09	8,544	7,729
Well Completion Flaring	0	0	0	0	0	4	0	0	0	0.00	0	0
Commuting Vehicles - Construction	16	2	1	0	1	0	0	157	0		158	143
Wind Erosion	4	1	---	---	---	---	---	---	---	---	---	---
Sub-total: Construction	34	7	74	2	21	9	1	8,673	0	0.09	8,702	7,872
Natural Gas Compression - Operations a	8	8	220	0	110	110	33	87,791	184	0.79	91,890	83,520

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	86	0	0.00	86	78
Dehy venting and flashing	---	---	---	---	---	13	5	139	8		317	304
Station Visits - Operations	17	2	0	0	1	0	0	58	0		58	52
Well Workover - Operations	0	0	1	0	0	0	0	173	0	0.00	174	157
Well & Pipeline visits for Inspection & Repair - Operations	14	1	0	0	0	0	0	25	0		25	22
Tanks Condensate and Loadout	---	---	---	---	---	9	1	1	2		32	32
Wellhead Fugitives	---	---	---	---	---	215	22	127	1,972		41,532	41,520
Pneumatic Devices	---	---	---	---	---	158	16	93	1,448		30,502	30,493
	16	2	0	0	0	0	0	41	0		41	37
Sub-total: Operations	55	12	222	1	112	505	76	88,532	3,613	0.79	164,657	156,217

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Maintenance	1	0	0	0	0	0	0	30	0		30	27
Sub-total: Maintenance	1	0	0	0	0	0	0	30	0	0.00	30	27
Road Reclamation	0	0	0	0	0	0	0	1	0		1	1
Well Reclamation	1	0	0	0	0	0	0	19	0		19	17
Sub-total: Reclamation	1	0	0	0	0	0	0	19	0	0.00	19	18
Total Emissions	91	20	296	2	133	515	77	97,255	3,613	0.88	173,408	164,134
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.22. Total Annual Emissions from Natural Gas Wells - Year 2024 - Alternative D - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	11	1	---	---	---	---	---	---	---		---	---
Heavy Equipment Combustive Emissions a	4	4	73	2	20	5	1	8,516	0	0.09	8,544	7,729
Well Completion Flaring	0	0	0	0	0	4	0	0	0	0.00	0	0
Commuting Vehicles - Construction	16	2	1	0	1	0	0	157	0		158	143
Wind Erosion	4	1	---	---	---	---	---	---	---		---	---
Sub-total: Construction	34	7	74	2	21	9	1	8,673	0	0.09	8,702	7,872
Natural Gas Compression - Operations a	9	9	260	1	130	130	39	103,895	217	0.94	108,747	98,841

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricTonnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	101	0	0.00	101	92
Dehy venting and flashing	---	---	---	---	---	11	4	119	7		272	261
Station Visits - Operations	20	2	0	0	1	0	0	68	0		68	62
Well Workover - Operations	0	0	1	0	0	0	0	173	0	0.00	174	157
Well & Pipeline visits for Inspection & Repair - Operations	17	2	0	0	0	0	0	29	0		29	27
Tanks Condensate and Load-out	---	---	---	---	---	8	1	1	1		28	28
Wellhead Fugitives	---	---	---	---	---	254	25	150	2,333		49,151	49,137
Pneumatic Devices	---	---	---	---	---	187	19	110	1,714		36,097	36,087
	19	2	0	0	0	0	0	49	0		49	44
Sub-total: Operations	65	15	262	1	132	591	88	104,696	4,273	0.94	194,717	184,736

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO_2eq	CO2eq-metricT-onnes
Road Maintenance	1	0	0	0	0	0	0	35	0		35	32
Sub-total: Maintenance	1	0	0	0	0	0	0	35	0	0.00	35	32
Road Reclamation	0	0	0	0	0	0	0	1	0		1	1
Well Reclamation	1	0	0	0	0	0	0	22	0		22	20
Sub-total: Reclamation	1	0	0	0	0	0	0	23	0	0.00	23	21
Total Emissions	101	22	337	2	154	600	89	113,427	4,273	1.02	203,477	192,661

[a] HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately

Table M.23. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2005 - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	9	1	---	---	---	---	---	---	---	---	---	---
Wind Erosion	9	1	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	1	1	15	0	7	1	0	1,791	0	0.01	1,794	1,628
Commuting Vehicles - Construction	8	1	0	0	0	0	0	45	0		45	41
Sub-total: Construction	27	4	15	0	7	2	0	1,836	0	0.01	1,839	1,669
Natural Gas Compression - Operations a	2	2	44	0	22	22	7	17,752	37	0.16	18,581	16,861
Dehydrators	0	0	0	0	0	43	22	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	62	6	793	21,346		449,062	407,497

Activity	Annual Emissions (Tons)											
	PM_{10}	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Pneumatics	---	---	---	---	---	8	1	107	1,667		35,123	31,872
Station Visits - Operations	55	6	1	0	1	1	0	96	0		96	87
Well Workover - Operations	1	0	1	0	0	0	0	108	0	0.00	108	98
Well & Pipeline visits for Inspection & Repair - Operations	289	29	2	0	6	3	0	414	0		414	376
Sub-total: Operations	346	36	48	0	30	139	36	19,269	23,051	0.16	503,384	456,791
Road Maintenance	16	2	5	0	2	1	0	596	0		596	541
	---	---	---	---	---	10,547	1,055		2,207		46,337	42,048
Sub-total: Maintenance	16	2	5	0	2	10,547	1,055	596	2,207	0.00	46,933	42,589
Road Reclamation	1	0	0	0	0	0	0	12	0		12	11
Well Reclamation	12	1	3	0	3	0	0	366	0		366	332
Sub-total: Reclamation	13	2	3	0	3	0	0	378	0	0.00	378	343

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Total Emissions	402	44	72	1	42	10,688	1,090	22,079	25,257	0.17	552,534	501,392
[a] HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.24. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2015 - Alternative A - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad & Station Construction - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---	---
Wind Erosion	9	1	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	1	1	12	0	5	1	0	1,554	0	0.01	1,556	1,412
Commuting Vehicles - Construction	7	1	0	0	0	0	0	42	0		42	39
Sub-total: **Construction**	22	4	13	0	5	1	0	1,596	0	0.01	1,599	1,451
Natural Gas Compression - Operations	1	1	24	0	12	12	4	9,443	20	0.08	9,885	8,970
Dehydrators	0	0	0	0	0	8	4	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	33	3	422	11,356		238,889	216,778
Pneumatics	---	---	---	---	---	4	0	57	887		18,685	16,955

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Station Visits - Operations	30	3	0	0	1	0	0	51	0		51	46
Well Workover - Operations	1	0	1	0	0	0	0	108	0	0.00	108	98
Well & Pipeline visits for Inspection & Repair - Operations	154	15	1	0	3	1	0	220	0		220	200
Sub-total: Operations	185	19	26	0	16	59	12	10,301	12,262	0.09	267,837	243,047
Road Maintenance	9	1	1	0	1	0	0	320	0		320	291
Evaporative Ponds	---	---	---	---	---	5,611	561		1,174		24,650	22,368
Sub-total: Maintenance	9	1	1	0	1	5,611	561	320	1,174	0.00	24,970	22,659
Road Reclamation	0	0	0	0	0	0	0	7	0		7	6
Well Reclamation	7	1	1	0	1	0	0	196	0		196	178
Sub-total: Reclamation	7	1	1	0	1	0	0	203	0	0.00	203	184

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	223	24	40	0	23	5,671	573	12,420	13,436	0.09	294,609	267,340
[a] HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.25. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2024 - Alternative A - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---	---
Wind Erosion	9	1	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	1	1	12	0	5	1	0	1,554	0	0.01	1,556	1,412
Commuting Vehicles - Construction	7	1	0	0	0	0	0	42	0		42	39
Sub-total: Construction	22	4	13	0	5	1	0	1,596	0	0.01	1,599	1,451
Natural Gas Compression - Operations a	0	0	3	0	1	1	0	1,135	2	0.01	1,188	1,078
Dehydrators	0	0	0	0	0	1	1	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	4	0	51	1,365		28,715	26,058

Activity	Annual Emissions (Tons)											
	PM_{10}	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Pneumatics	---	---	---	---	---	1	0	7	107		2,246	2,038
Station Visits - Operations	4	0	0	0	0	0	0	7	0		7	6
Well Workover - Operations	1	0	1	0	0	0	0	108	0	0.00	108	98
Well & Pipeline visits for Inspection & Repair - Operations	18	2	0	0	0	0	0	26	0		26	24
Sub-total: Operations	23	2	4	0	2	8	2	1,333	1,474	0.01	32,291	29,302
Road Maintenance	1	0	0	0	0	0	0	39	0		39	35
	---	---	---	---	---	674	67		141		2,963	2,689
Sub-total: Maintenance	1	0	0	0	0	674	67	39	141	0.00	3,002	2,724
Road Reclamation	0	0	0	0	0	0	0	1	0		1	1
Well Reclamation	1	0	0	0	0	0	0	24	0		24	21
Sub-total: Reclamation	1	0	0	0	0	0	0	24	0	0.00	24	22

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Total Emissions	47	6	16	0	8	683	69	2,992	1,615	0.02	36,915	33,498
[a] HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.26. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2015 - Alternative B - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad & Station Construction - Fugitive Dust	4	0	---	---	---	---	---	---	---	---	---	---
Wind Erosion	1	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	0	0	3	0	2	0	0	398	0	0.00	399	362
Commuting Vehicles - Construction	1	0	0	0	0	0	0	7	0		7	7
Sub-total: **Construction**	7	1	3	0	2	0	0	406	0	0.00	406	368
Natural Gas Compression - Operations	1	1	22	0	11	11	3	8,939	19	0.08	9,357	8,491
Dehydrators	0	0	0	0	0	8	4	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	31	3	400	10,750		226,140	205,209
Pneumatics	---	---	---	---	---	4	0	54	840		17,687	16,050

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Station Visits - Operations	28	3	0	0	1	0	0	48	0		48	43
Well Workover - Operations	0	0	0	0	0	0	0	12	0	0.00	12	11
Well & Pipeline visits for Inspection & Repair - Operations	145	15	1	0	3	1	0	209	0		209	189
Sub-total: Operations	174	18	24	0	15	56	11	9,661	11,608	0.08	253,453	229,994
Road Maintenance	8	1	1	0	0	0	0	303	0		303	275
Evaporative Ponds	---	---	---	---	---	5,311	531		1,111		23,335	21,175
Sub-total: Maintenance	8	1	1	0	0	5,311	531	303	1,111	0.00	23,638	21,450
Road Reclamation	0	0	0	0	0	0	0	6	0		6	6
Well Reclamation	6	1	1	0	1	0	0	185	0		186	168
Sub-total: Reclamation	6	1	1	0	1	0	0	192	0	0.00	192	174

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	195	21	29	0	18	5,368	542	10,562	12,719	0.08	277,689	251,986
[a] HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.27. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2024 - Alternative B - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	4	0	---	---	---	---	---	---	---	---	---	---
Wind Erosion	1	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	0	0	3	0	2	0	0	398	0	0.00	399	362
Commuting Vehicles - Construction	1	0	0	0	0	0	0	7	0		7	7
Sub-total: Construction	7	1	3	0	2	0	0	406	0	0.00	406	368
Natural Gas Compression - Operations a	0	0	0	0	0	0	0	127	0	0.00	133	121
Dehydrators	0	0	0	0	0	0	0	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	0	0	6	153		3,218	2,920

Activity	Annual Emissions (Tons)											
	PM_{10}	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Pneumatics	---	---	---	---	---	0	0	1	12		252	228
Station Visits - Operations	0	0	0	0	0	0	0	1	0		1	1
Well Workover - Operations	0	0	0	0	0	0	0	12	0	0.00	12	11
Well & Pipeline visits for Inspection & Repair - Operations	2	0	0	0	0	0	0	3	0		3	3
Sub-total: Operations	3	0	0	0	0	1	0	149	165	0.00	3,618	3,283
Road Maintenance	0	0	0	0	0	0	0	4	0		4	4
	---	---	---	---	---	76	8		16		332	301
Sub-total: Maintenance	0	0	0	0	0	76	8	4	16	0.00	336	305
Road Reclamation	0	0	0	0	0	0	0	0	0		0	0
Well Reclamation	0	0	0	0	0	0	0	3	0		3	2
Sub-total: Reclamation	0	0	0	0	0	0	0	3	0	0.00	3	2

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Total Emissions	9	1	4	0	2	77	8	562	181	0.00	4,363	3,960
[a] HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.28. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2015 - Alternative C - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad & Station Construction - Fugitive Dust	16	2	---	---	---	---	---	---	---	---	---	---
Wind Erosion	52	8	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	4	5	62	2	24	5	1	7,842	0	0.04	7,857	7,130
Commuting Vehicles - Construction	36	4	1	0	1	1	0	233	0		233	211
Sub-total: **Construction**	109	18	63	2	25	6	1	8,075	0	0.04	8,090	7,341
Natural Gas Compression - Operations	1	1	31	0	15	15	5	12,194	26	0.11	12,764	11,583
Dehydrators	0	0	0	0	0	11	5	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	42	4	545	14,664		308,483	279,931
Pneumatics	---	---	---	---	---	6	1	73	1,145		24,128	21,895

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Station Visits - Operations	38	4	0	0	1	0	0	66	0		66	60
Well Workover - Operations	3	0	4	0	1	0	0	629	0	0.01	631	572
Well & Pipeline visits for Inspection & Repair - Operations	198	20	2	0	4	2	0	284	0		285	258
Sub-total: Operations	241	25	37	0	22	77	15	13,792	15,835	0.12	346,357	314,298
Road Maintenance	11	1	1	0	1	0	0	414	0		414	375
Evaporative Ponds	---	---	---	---	---	7,245	725		1,516		31,831	28,885
Sub-total: Maintenance	11	1	1	0	1	7,245	725	414	1,516	0.00	32,245	29,260
Road Reclamation	0	0	0	0	0	0	0	9	0		9	8
Well Reclamation	8	1	1	0	1	0	0	253	0		253	230
Sub-total: Reclamation	9	1	1	0	1	0	0	262	0	0.00	262	238

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	369	45	102	2	49	7,328	740	22,543	17,351	0.16	386,954	351,138
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression												

Table M.29. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2024 - Alternative C - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eqmetricTonnes**
Well Pad & Station Construction - Fugitive Dust	16	2	---	---	---	---	---	---	---	---	---	---
Wind Erosion	52	8	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	4	5	62	2	24	5	1	7,842	0	0.04	7,857	7,130
Commuting Vehicles - Construction	36	4	1	0	1	1	0	233	0		233	211
Sub-total: Construction	109	18	63	2	25	6	1	8,075	0	0.04	8,090	7,341
Natural Gas Compression - Operations a	1	1	17	0	8	8	2	6,637	14	0.06	6,947	6,304
Dehydrators	0	0	0	0	0	9	4	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	23	2	297	7,981		167,905	152,364
Pneumatics	---	---	---	---	---	3	0	40	623		13,133	11,917

Activity	Annual Emissions (Tons)											
	PM_{10}	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eqmetricTonnes**
Station Visits - Operations	21	2	0	0	1	0	0	36	0		36	33
Well Workover - Operations	3	0	4	0	1	0	0	629	0	0.01	631	572
Well & Pipeline visits for Inspection & Repair - Operations	108	11	1	0	2	1	0	155	0		155	141
Sub-total: Operations	133	14	22	0	12	45	10	7,794	8,619	0.07	188,807	171,331
Road Maintenance	6	1	0	0	0	0	0	225	0		225	204
	---	---	---	---	---	3,943	394		825		17,325	15,722
Sub-total: Maintenance	6	1	0	0	0	3,944	394	225	825	0.00	17,551	15,926
Road Reclamation	0	0	0	0	0	0	0	5	0		5	4
Well Reclamation	5	1	0	0	0	0	0	138	0		138	125
Sub-total: Reclamation	5	1	0	0	0	0	0	142	0	0.00	142	129
Total Emissions	252	33	85	2	38	3,994	405	16,237	9,444	0.11	214,590	194,728

[a] HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately

Table M.30. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2015 - Alternative D - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad & Station Construction - Fugitive Dust	10	1	---	---	---	---	---	---	---	---	---	---
Wind Erosion	27	4	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	2	3	33	1	13	3	0	4,164	0	0.02	4,171	3,785
Commuting Vehicles - Construction	19	2	0	0	1	0	0	121	0		122	110
Sub-total: **Construction**	58	9	33	1	14	3	0	4,285	0	0.02	4,293	3,895
Natural Gas Compression - Operations	1	1	27	0	13	13	4	10,586	22	0.10	11,081	10,055
Dehydrators	0	0	0	0	0	9	5	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	37	4	473	12,730		267,799	243,012
Pneumatics	---	---	---	---	---	5	0	64	994		20,946	19,007

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Station Visits - Operations	33	3	0	0	1	0	0	57	0		57	52
Well Workover - Operations	2	0	2	0	1	0	0	324	0	0.00	325	295
Well & Pipeline visits for Inspection & Repair - Operations	172	17	1	0	4	2	0	247	0		247	224
Sub-total: Operations	208	22	30	0	19	66	13	11,751	13,746	0.10	300,455	272,645
Road Maintenance	10	1	1	0	1	0	0	359	0		359	326
Evaporative Ponds	---	---	---	---	---	6,290	629		1,316		27,633	25,075
Sub-total: Maintenance	10	1	1	0	1	6,290	629	359	1,316	0.00	27,992	25,401
Road Reclamation	0	0	0	0	0	0	0	7	0		7	7
Well Reclamation	7	1	1	0	1	0	0	220	0		220	199
Sub-total: Reclamation	8	1	1	0	1	0	0	227	0	0.00	227	206

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	283	33	66	1	34	6,359	642	16,622	15,062	0.12	332,967	302,148
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression												

Table M.31. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2024 - Alternative D - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	10	1	---	---	---	---	---	---	---	---	---	---
Wind Erosion	27	4	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	2	3	33	1	13	3	0	4,164	0	0.02	4,171	3,785
Commuting Vehicles - Construction	19	2	0	0	1	0	0	121	0		122	110
Sub-total: Construction	58	9	33	1	14	3	0	4,285	0	0.02	4,293	3,895
Natural Gas Compression - Operations a	0	0	9	0	4	4	1	3,421	7	0.03	3,581	3,249
Dehydrators	0	0	0	0	0	5	2	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	12	1	153	4,113		86,536	78,527

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Pneumatics	---	---	---	---	---	2	0	21	321		6,768	6,142
Station Visits - Operations	11	1	0	0	0	0	0	19	0		19	17
Well Workover - Operations	2	0	2	0	1	0	0	324	0	0.00	325	295
Well & Pipeline visits for Inspection & Repair - Operations	56	6	0	0	1	1	0	80	0		80	72
Sub-total: Operations	69	7	11	0	6	23	5	4,017	4,442	0.03	97,309	88,302
Road Maintenance	3	0	0	0	0	0	0	116	0		116	105
	---	---	---	---	---	2,032	203		425		8,929	8,103
Sub-total: Maintenance	3	0	0	0	0	2,032	203	116	425	0.00	9,045	8,208
Road Reclamation	0	0	0	0	0	0	0	2	0		2	2
Well Reclamation	2	0	0	0	0	0	0	71	0		71	64
Sub-total: Reclamation	2	0	0	0	0	0	0	73	0	0.00	73	67

Activity	Annual Emissions (Tons)											
	PM_{10}	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	132	17	45	1	20	2,059	209	8,492	4,867	0.06	110,721	100,473
[a] HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.32. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2005 - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	33	3	---	---	---	---	---	---	---	---	---	---
Wind Erosion	57	9	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	6	6	78	2	32	7	1	9,789	0	0.05	9,806	8,898
Commuting Vehicles - Construction	44	4	1	0	2	1	0	272	0		273	247
Sub-total: **Construction**	140	23	79	2	34	8	1	10,061	0	0.05	10,078	9,146
Natural Gas Compression - Operations a	4	4	126	0	63	63	19	50,231	105	0.45	52,578	47,711
Dehydrators	0	0	0	0	0	122	61	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	174	17	2,245	60,402		1,270,693	1,153,079

Activity	Annual Emissions (Tons)											
	PM_{10}	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Pneumatics	---	---	---	---	---	23	2	302	4,718		99,387	90,187
Station Visits - Operations	156	16	2	0	4	2	0	269	0		269	244
Well Workover - Operations	4	0	5	0	1	0	0	701	0	0.01	704	639
Well & Pipeline visits for Inspection & Repair - Operations	817	82	7	0	18	8	1	1,172	0		1,172	1,063
Sub-total: Operations	981	102	139	0	86	392	101	54,920	65,226	0.46	1,424,803	1,292,924
Road Maintenance	46	5	15	0	6	1	0	1,686	0		1,686	1,530
Evaporative Ponds	---	---	---	---	---	29,844	2,984		6,244		131,118	118,982
Sub-total: Maintenance	46	5	15	0	6	29,845	2,985	1,686	6,244	0.00	132,804	120,512
Road Reclamation	1	0	0	0	0	0	0	35	0		35	32
Well Reclamation	35	4	9	0	7	1	0	1,035	0		1,036	940

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Reclama-tion	37	4	10	0	8	1	0	1,070	0	0.00	1,070	971
Total Emissions	1,204	134	243	3	133	30,247	3,086	67,738	71,470	0.51	1,568,756	1,423,553
[a] HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.33. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2015 - Alternative A - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad & Station Construction - Fugitive Dust	24	2	---	---	---	---	---	---	---	---	---	---
Wind Erosion	57	9	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	5	6	73	2	29	7	1	9,178	0	0.05	9,195	8,344
Commuting Vehicles - Construction	42	4	1	0	2	1	0	265	0		265	241
Sub-total: **Construction**	129	21	74	2	30	7	1	9,443	0	0.05	9,460	8,584
Natural Gas Compression - Operations	2	2	72	0	36	36	11	28,818	60	0.26	30,164	27,372
Dehydrators	0	0	0	0	0	25	13	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	100	10	1,288	34,653		729,001	661,525
Pneumatics	---	---	---	---	---	13	1	173	2,707		57,018	51,741

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Station Visits - Operations	89	9	1	0	2	1	0	154	0		154	140
Well Workover - Operations	4	0	5	0	1	0	0	701	0	0.01	704	639
Well & Pipeline visits for Inspection & Repair - Operations	469	47	4	0	10	5	0	672	0		672	610
Sub-total: Operations	564	59	82	0	50	180	35	31,807	37,420	0.27	817,714	742,027
Road Maintenance	26	3	3	0	2	0	0	978	0		978	887
Evaporative Ponds	---	---	---	---	---	17,122	1,712		3,582		75,223	68,260
Sub-total: Maintenance	26	3	3	0	2	17,122	1,712	978	3,582	0.00	76,201	69,148
Road Reclamation	1	0	0	0	0	0	0	20	0		20	19
Well Reclamation	20	2	2	0	2	0	0	598	0		598	543
Sub-total: Reclamation	21	2	2	0	2	0	0	618	0	0.00	619	561

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	740	85	161	2	84	17,310	1,748	42,846	41,002	0.31	903,993	820,320
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression												

Table M.34. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2024 - Alternative A - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	24	2	---	---	---	---	---	---	---	---	---	---
Wind Erosion	57	9	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	5	6	73	2	29	7	1	9,178	0	0.05	9,195	8,344
Commuting Vehicles - Construction	42	4	1	0	2	1	0	265	0		265	241
Sub-total: **Construction**	129	21	74	2	30	7	1	9,443	0	0.05	9,460	8,584
Natural Gas Compression - Operations a	1	1	19	0	9	9	3	7,404	15	0.07	7,750	7,033
Dehydrators	0	0	0	0	0	10	5	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	26	3	331	8,904		187,308	169,971

Activity	Annual Emissions (Tons)											
	PM_{10}	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Pneumatics	---	---	---	---	---	3	0	45	696		14,650	13,294
Station Visits - Operations	23	2	0	0	1	0	0	40	0		40	37
Well Workover - Operations	4	0	5	0	1	0	0	701	0	0.01	704	639
Well & Pipeline visits for Inspection & Repair - Operations	120	12	1	0	3	1	0	173	0		173	157
Sub-total: Operations	148	15	24	0	14	50	11	8,694	9,615	0.07	210,626	191,131
Road Maintenance	7	1	0	0	0	0	0	251	0		251	228
Evaporative Ponds	---	---	---	---	---	4,399	440		920		19,328	17,539
Sub-total: Maintenance	7	1	0	0	0	4,399	440	251	920	0.00	19,579	17,767
Road Reclamation	0	0	0	0	0	0	0	5	0		5	5
Well Reclamation	5	1	0	0	0	0	0	154	0		154	139

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Reclama-tion	5	1	0	0	0	0	0	159	0	0.00	159	144
Total Emissions	285	38	99	2	45	4,456	451	18,548	10,535	0.12	239,824	217,626
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression												

Table M.35. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2015 - Alternative B - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad & Station Construction - Fugitive Dust	20	2	---	---	---	---	---	---	---	---	---	---
Wind Erosion	49	7	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	5	5	63	2	25	6	1	7,899	0	0.04	7,914	7,181
Commuting Vehicles - Construction	36	4	1	0	1	0	0	226	0		226	205
Sub-total: **Construction**	111	18	64	2	26	6	1	8,126	0	0.04	8,140	7,387
Natural Gas Compression - Operations	2	2	71	0	35	35	11	28,314	59	0.25	29,636	26,893
Dehydrators	0	0	0	0	0	25	12	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	98	10	1,266	34,047		716,252	649,956
Pneumatics	---	---	---	---	---	13	1	170	2,660		56,021	50,836

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Station Visits - Operations	88	9	1	0	2	1	0	152	0		152	138
Well Workover - Operations	3	0	4	0	1	0	0	595	0	0.01	597	542
Well & Pipeline visits for Inspection & Repair - Operations	461	46	4	0	10	4	0	661	0		661	599
Sub-total: Operations	554	58	80	0	49	177	35	31,157	36,766	0.26	803,319	728,965
Road Maintenance	26	3	3	0	2	0	0	961	0		961	872
Evaporative Ponds	---	---	---	---	---	16,822	1,682		3,519		73,907	67,067
Sub-total: Maintenance	26	3	3	0	2	16,823	1,682	961	3,519	0.00	74,868	67,938
Road Reclamation	1	0	0	0	0	0	0	20	0		20	18
Well Reclamation	20	2	2	0	2	0	0	587	0		588	533
Sub-total: Reclamation	20	2	2	0	2	0	0	608	0	0.00	608	551

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	712	81	149	2	79	17,006	1,718	40,851	40,285	0.30	886,935	804,841
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression												

Table M.36. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2024 - Alternative B - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	22	2	---	---	---	---	---	---	---	---	---	---
Wind Erosion	49	7	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	5	5	63	2	25	6	1	7,899	0	0.04	7,914	7,181
Commuting Vehicles - Construction	36	4	1	0	1	0	0	226	0		226	205
Sub-total: **Construction**	111	18	64	2	26	6	1	8,126	0	0.04	8,140	7,387
Natural Gas Compression - Operations a	1	1	16	0	8	8	2	6,396	13	0.06	6,695	6,076
Dehydrators	0	0	0	0	0	8	4	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	22	2	286	7,692		161,811	146,834

Activity	Annual Emissions (Tons)											
	PM_{10}	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Pneumatics	---	---	---	---	---	3	0	38	601		12,656	11,485
Station Visits - Operations	20	2	0	0	1	0	0	35	0		35	31
Well Workover - Operations	3	0	4	0	1	0	0	595	0	0.01	597	542
Well & Pipeline visits for Inspection & Repair - Operations	104	10	1	0	2	1	0	149	0		149	135
Sub-total: Operations	128	13	21	0	12	43	9	7,500	8,306	0.06	181,943	165,102
Road Maintenance	6	1	0	0	0	0	0	217	0		217	197
Evaporative Ponds	---	---	---	---	---	3,800	380		795		16,697	15,151
Sub-total: Maintenance	6	1	0	0	0	3,800	380	217	795	0.00	16,914	15,348
Road Reclamation	0	0	0	0	0	0	0	4	0		4	4
Well Reclamation	4	1	0	0	0	0	0	133	0		133	120

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Reclama-tion	5	1	0	0	0	0	0	137	0	0.00	137	125
Total Emissions	250	33	85	2	39	3,850	390	15,980	9,101	0.10	207,134	187,962
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression												

Table M.37. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2015 - Alternative C - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad & Station Construction - Fugitive Dust	35	3	---	---	---	---	---	---	---	---	---	---
Wind Erosion	99	15	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	9	9	121	3	47	11	1	15,339	0	0.08	15,368	13,945
Commuting Vehicles - Construction	71	7	2	0	3	1	0	452	0		452	410
Sub-total: **Construction**	213	35	123	3	49	12	1	15,791	0	0.08	15,820	14,355
Natural Gas Compression - Operations	3	3	79	0	40	40	12	31,569	66	0.28	33,044	29,985
Dehydrators	0	0	0	0	0	28	14	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	109	11	1,411	37,961		798,596	724,678
Pneumatics	---	---	---	---	---	15	1	190	2,965		62,462	56,680

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Station Visits - Operations	98	10	1	0	3	1	0	169	0		169	154
Well Workover - Operations	6	1	8	0	2	1	0	1,212	0	0.01	1,216	1,103
Well & Pipeline visits for Inspection & Repair - Operations	514	51	4	0	11	5	0	736	0		737	668
Sub-total: Operations	621	65	92	0	56	198	39	35,287	40,993	0.30	896,223	813,269
Road Maintenance	29	3	4	0	2	1	0	1,071	0		1,071	972
Evaporative Ponds	---	---	---	---	---	18,756	1,876		3,924		82,404	74,777
Sub-total: Maintenance	29	3	4	0	2	18,757	1,876	1,071	3,924	0.00	83,475	75,749
Road Reclamation	1	0	0	0	0	0	0	22	0		22	20
Well Reclamation	22	2	3	0	3	0	0	655	0		655	595
Sub-total: Reclamation	23	2	3	0	3	0	0	677	0	0.00	678	615

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	885	105	222	4	110	18,967	1,916	52,826	44,917	0.38	996,195	903,988
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression												

Table M.38. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2024 - Alternative C - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	35	3	---	---	---	---	---	---	---	---	---	---
Wind Erosion	99	15	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	9	9	121	3	47	11	1	15,339	0	0.08	15,638	13,945
Commuting Vehicles - Construction	71	7	2	0	3	1	0	452	0		452	410
Sub-total: **Construction**	213	35	123	3	49	12	1	15,791	0	0.08	15,820	14,355
Natural Gas Compression - Operations a	1	1	32	0	16	16	5	12,907	27	0.12	13,509	12,259
Dehydrators	0	0	0	0	0	17	9	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	45	4	577	15,520		326,498	296,277

Activity	Annual Emissions (Tons)											
	PM_{10}	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Pneumatics	---	---	---	---	---	6	1	78	1,212		25,537	23,173
Station Visits - Operations	40	4	0	0	1	0	0	69	0		69	63
Well Workover - Operations	6	1	8	0	2	1	0	1,212	0	0.01	1,216	1,103
Well & Pipeline visits for Inspection & Repair - Operations	210	21	2	0	5	2	0	301	0		301	273
Sub-total: Operations	257	27	43	0	24	87	19	15,143	16,759	0.13	367,130	333,149
Road Maintenance	12	1	0	0	0	0	0	438	0		438	398
Evaporative Ponds	---	---	---	---	---	7,668	767		1,604		33,690	30,572
Sub-total: Maintenance	12	1	0	0	0	7,668	767	438	1,604	0.00	34,128	30,969
Road Reclamation	0	0	0	0	0	0	0	9	0		9	8
Well Reclamation	9	1	0	0	0	0	0	268	0		268	243

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Reclama-tion	9	1	0	0	0	0	0	277	0	0.00	277	251
Total Emissions	492	64	166	4	74	7,767	787	31,649	18,364	0.21	417,355	378,725
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression												

Table M.39. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2015 - Alternative D - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad & Station Construction - Fugitive Dust	29	3	---	---	---	---	---	---	---	---	---	---
Wind Erosion	75	11	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	7	7	93	2	36	8	1	11,792	0	0.06	11,814	10,721
Commuting Vehicles - Construction	54	5	1	0	2	1	0	344	0		344	312
Sub-total: **Construction**	165	27	95	2	38	9	1	12,137	0	0.06	12,159	11,033
Natural Gas Compression - Operations	3	3	75	0	38	38	11	29,960	63	0.27	31,360	28,457
Dehydrators	0	0	0	0	0	26	13	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	104	10	1,339	36,027		757,911	687,760
Pneumatics	---	---	---	---	---	14	1	180	2,814		59,280	53,793

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Station Visits - Operations	93	9	1	0	2	1	0	161	0		161	146
Well Workover - Operations	5	1	6	0	2	0	0	918	0	0.01	921	836
Well & Pipeline visits for Inspection & Repair - Operations	487	49	4	0	11	5	0	699	0		699	634
Sub-total: Operations	588	61	86	0	52	188	37	33,257	38,904	0.28	850,332	771,626
Road Maintenance	28	3	3	0	2	0	0	1,017	0		1,017	923
Evaporative Ponds	---	---	---	---	---	17,801	1,780		3,724		78,206	70,967
Sub-total: Maintenance	28	3	3	0	2	17,801	1,780	1,017	3,724	0.00	79,223	71,890
Road Reclamation	1	0	0	0	0	0	0	21	0		21	19
Well Reclamation	21	2	2	0	2	0	0	622	0		622	564
Sub-total: Reclamation	22	2	3	0	3	0	0	643	0	0.00	643	584

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	802	93	187	3	95	17,998	1,818	47,053	42,628	0.34	942,356	855,133
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression												

Table M.40. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2024 - Alternative D - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	29	3	---	---	---	---	---	---	---	---	---	---
Wind Erosion	75	11	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	7	7	93	2	36	8	1	11,792	0	0.06	11,814	10,721
Commuting Vehicles - Construction	54	5	1	0	2	1	0	344	0		344	312
Sub-total: **Construction**	165	27	95	2	38	9	1	12,137	0	0.06	12,159	11,033
Natural Gas Compression - Operations a	1	1	24	0	12	12	4	9,690	20	0.09	10,143	9,204
Dehydrators	0	0	0	0	0	13	6	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	34	3	433	11,652		245,129	222,440

Activity	Annual Emissions (Tons)											
	PM_{10}	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Pneumatics	---	---	---	---	---	5	0	58	910		19,173	17,398
Station Visits - Operations	30	3	0	0	1	0	0	52	0		52	47
Well Workover - Operations	5	1	6	0	2	0	0	918	0	0.01	921	836
Well & Pipeline visits for Inspection & Repair - Operations	158	16	1	0	3	2	0	226	0		226	205
Sub-total: Operations	193	20	32	0	18	65	14	11,377	12,583	0.10	275,644	250,130
Road Maintenance	9	1	0	0	0	0	0	329	0		329	298
Evaporative Ponds	---	---	---	---	---	5,757	576		1,204		25,294	22,953
Sub-total: Maintenance	9	1	0	0	0	5,757	576	329	1,204	0.00	25,623	23,251
Road Reclamation	0	0	0	0	0	0	0	7	0		7	6
Well Reclamation	7	1	0	0	0	0	0	201	0		201	183

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Reclama-tion	7	1	0	0	0	0	0	208	0	0.00	208	189
Total Emissions	374	49	127	3	57	5,832	591	24,051	13,787	0.16	313,633	284,603
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression												

Table M.41. Total Annual Emissions from Oil Wells - Year 2005 - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	0.00	0.00	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Commuting Vehicles - Construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Sub-total: **Construction**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9,646.70
Well Workover Operations - Fugitive Dust	0.00	0.00	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	473.97	0.00	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	24.10	2.40	0.12	0.00	2.53	0.11	0.01	50.26	0.01	0.02	55	50
Oil - hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Sub-total: Operations	24.10	2.40	0.12	0.00	2.53	0.11	0.01	524.23	0.01	0.02	529.29	480.30
Road Maintenance	14.12	1.58	4.21	0.11	1.60	0.34	0.03	511.57	0.01	0.01	514	466
Sub-total: Maintenance	14.12	1.58	4.21	0.11	1.60	0.34	0.03	511.57	0.01	0.01	513.77	466.22
Total Emissions	38.22	3.98	4.33	0.11	4.13	0.45	0.05	1,035.80	0.01	0.02	1,043.06	10,593.21
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.42. Total Annual Emissions from Oil Wells - Year 2015 - Alternative A - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	4.76	0.71	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	29.13	29.09	766.72	91.88	174.01	30.36	3.04	35,364.22	1.81	0.39	35,522	32,235
Commuting Vehicles - Construction	12.46	1.25	0.19	0.00	0.69	0.05	0.00	58.90	0.67	0.67	280	255
Sub-total: **Construction**	46.35	31.06	766.91	91.88	174.70	30.41	3.04	35,423.12	2.48	1.06	35,802.96	32,489.08
Well Workover Operations - Fugitive Dust	0.20	0.02	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	1.65	1.65	23.21	1.53	5.00	1.90	0.19	473.97	0.01	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.73	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	28.80	2.87	0.14	0.00	3.02	0.13	0.01	60.07	0.01	0.02	66	60
Oil - hauling	110.59	11.03	0.93	0.00	0.59	0.12	0.01	270.11	0.01	0.00	271	246
Sub-total: Operations	141.23	15.57	24.28	1.54	8.62	2.16	0.22	804.87	0.03	0.02	812.15	736.98
Road Maintenance	16.87	1.89	5.03	0.14	1.91	0.41	0.04	4.38	607.35	0.01	12,761	11,580
Sub-total: Maintenance	16.87	1.89	5.03	0.14	1.91	0.41	0.04	4.38	607.35	0.01	12,761.22	11,580.05
Total Emissions	204.45	48.51	796.21	93.55	185.23	32.98	3.30	36,232.37	609.86	1.09	49,376.33	44,806.11
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.43. Total Annual Emissions from Oil Wells - Year 2024 - Alternative A - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	4.76	0.71	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring a	29.13	29.09	766.72	91.88	174.01	30.36	3.04	35,364.22	1.81	0.39	35,522	32,235
Commuting Vehicles - Construction	12.46	1.25	0.19	0.00	0.69	0.05	0.00	58.90	0.67	0.67	280	255
Sub-total: **Construction**	46.35	31.06	766.91	91.88	174.70	30.41	3.04	35,423.12	2.48	1.06	35,802.96	32,489.08
Well Workover Operations - Fugitive Dust	0.20	0.02	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	1.65	1.65	23.21	1.53	5.00	1.90	0.19	473.97	0.01	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.73	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	33.50	3.34	0.17	0.00	3.51	0.16	0.02	69.87	0.01	0.02	77	70
Oil - hauling	128.36	12.83	0.78	0.00	0.49	0.10	0.01	226.02	0.01	0.00	227	206
Sub-total: Operations	163.70	17.83	24.15	1.54	9.02	2.16	0.22	770.58	0.03	0.02	778.70	706.63
Road Maintenance	19.63	2.19	5.85	0.158	2.23	0.47	0.05	5.09	706.48	0.01	14,844	13,470
Sub-total: Maintenance	19.63	2.19	5.85	0.16	2.23	0.47	0.05	5.09	706.48	0.01	14,844.18	13,470.22
Total Emissions	229.68	51.09	796.91	93.58	185.94	33.04	3.30	36,198.80	709.00	1.09	51,425.85	46,665.92
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.44. Total Annual Emissions from Oil Wells - Year 2015 - Alternative B - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	0.02	0.00	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	0.11	0.11	2.94	0.35	0.67	0.12	0.01	135.42	0.01	0.00	136	123
Commuting Vehicles - Construction	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	1	1
Sub-total: **Construction**	0.18	0.12	2.94	0.35	0.67	0.12	0.01	135.65	0.01	0.00	137.10	124.41
Well Workover Operations - Fugitive Dust	0.00	0.00	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	0.01	0.01	0.09	0.01	0.02	0.01	0.00	473.97	0.00	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	19.28	1.92	0.10	0.00	2.02	0.09	0.01	40.21	0.01	0.01	44	40
Oil - hauling	74.13	7.38	0.62	0.00	0.39	0.08	0.01	180.79	0.01	0.00	181	165
Sub-total: Operations	93.41	9.31	0.81	0.01	2.43	0.18	0.02	694.97	0.02	0.01	699.63	634.87
Road Mainte-nance	11.29	1.26	3.37	0.09	1.28	0.27	0.03	2.93	406.52	0.01	8,542	7,751
Sub-total: Mainte-nance	11.29	1.26	3.37	0.09	1.28	0.27	0.03	2.93	406.52	0.01	8,541.62	7,751.02
Total Emissions	104.88	10.69	7.11	0.45	4.38	0.57	0.06	833.55	406.55	0.02	9,378.36	8,510.30
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.45. Total Annual Emissions from Oil Wells - Year 2024 - Alternative B - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad Construction - Fugitive Dust	0.02	0.00	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring a	0.11	0.11	2.94	0.35	0.67	0.12	0.01	135.42	0.01	0.00	136	123
Commuting Vehicles - Construction	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	1	1
Sub-total: **Construction**	0.18	0.12	2.94	0.35	0.67	0.12	0.01	135.65	0.01	0.00	137.10	124.41
Well Workover Operations - Fugitive Dust	0.00	0.00	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	0.01	0.01	0.09	0.01	0.02	0.01	0.00	473.97	0.00	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	14.46	1.44	0.07	0.00	1.52	0.07	0.01	30.15	0.00	0.01	33	30
Oil - hauling	55.41	5.54	0.78	0.00	0.49	0.10	0.01	226.02	0.01	0.00	227	206
Sub-total: Operations	69.87	6.98	0.94	0.01	2.03	0.17	0.02	730.14	0.02	0.01	733.94	666.01
Road Maintenance	8.47	0.95	2.53	0.068	0.96	0.20	0.02	2.20	304.84	0.00	6,405	5,812
Sub-total: Maintenance	8.47	0.95	2.53	0.07	0.96	0.20	0.02	2.20	304.84	0.00	6,405.00	5,812.16
Total Emissions	78.52	8.05	6.40	0.43	3.65	0.49	0.05	867.98	304.86	0.02	7,276.02	6,602.58
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.46. Total Annual Emissions from Oil Wells - Year 2015 - Alternative C - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad Construction - Fugitive Dust	5.18	0.78	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	31.72	31.67	834.66	100.02	189.43	33.05	3.31	38,498.24	1.97	0.42	38,671	35,091
Commuting Vehicles - Construction	13.56	1.36	0.21	0.00	0.75	0.05	0.01	64.12	0.73	0.73	305	277
Sub-total: **Construction**	50.46	33.81	834.87	100.02	190.18	33.11	3.31	38,562.37	2.70	1.15	38,975.87	35,368.31
Well Workover Operations - Fugitive Dust	0.22	0.02	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	1.79	1.79	25.26	1.67	5.44	2.07	0.21	473.97	0.01	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.79	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	29.65	2.95	0.15	0.00	3.11	0.14	0.01	61.84	0.01	0.02	68	62
Oil - hauling	113.83	11.36	0.96	0.00	0.60	0.12	0.01	278.06	0.01	0.00	279	253
Sub-total: Operations	145.49	16.12	26.37	1.68	9.17	2.34	0.23	814.65	0.04	0.02	822.15	746.05
Road Maintenance	17.37	1.94	5.18	0.14	1.97	0.42	0.04	4.51	625.23	0.01	13,137	11,921
Sub-total: Maintenance	17.37	1.94	5.18	0.14	1.97	0.42	0.04	4.51	625.23	0.01	13,136.83	11,920.90
Total Emissions	213.31	51.87	866.41	101.84	201.32	35.86	3.59	39,381.52	627.96	1.18	52,934.87	48,035.28
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.47. Total Annual Emissions from Oil Wells - Year 2024 - Alternative C - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad Construction - Fugitive Dust	5.18	0.78	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring a	31.72	31.67	834.66	100.02	189.43	33.05	3.31	38,498.24	1.97	0.42	38,671	35,091
Commuting Vehicles - Construction	13.56	1.36	0.21	0.00	0.75	0.05	0.00	64.12	0.73	0.73	305	277
Sub-total: **Construction**	50.46	33.81	834.87	100.02	190.18	33.11	3.31	38,562.37	2.70	1.15	38,975.87	35,368.31
Well Workover Operations - Fugitive Dust	0.22	0.02	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	1.79	1.79	25.26	1.67	5.44	2.07	0.21	473.97	0.01	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.79	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	35.20	3.50	0.17	0.00	3.69	0.16	0.02	73.41	0.01	0.02	81	73
Oil - hauling	134.85	13.48	0.78	0.00	0.49	0.10	0.01	226.02	0.01	0.00	227	206
Sub-total: Operations	172.06	18.80	26.21	1.67	9.64	2.34	0.23	774.18	0.04	0.03	782.69	710.24
Road Maintenance	20.62	2.30	6.15	0.166	2.34	0.50	0.05	5.35	742.24	0.01	15,595	14,152
Sub-total: Maintenance	20.62	2.30	6.15	0.17	2.34	0.50	0.05	5.35	742.24	0.01	15,595.42	14,151.92
Total Emissions	243.13	54.91	867.23	101.86	202.16	35.94	3.59	39,341.90	744.97	1.19	55,353.98	50,230.47
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.48. Total Annual Emissions from Oil Wells - Year 2015 - Alternative D - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	4.61	0.69	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	28.26	28.22	743.65	89.11	168.77	29.45	2.95	34,300.19	1.75	0.38	34,454	31,265
Commuting Vehicles - Construction	12.08	1.21	0.18	0.00	0.67	0.05	0.00	57.13	0.65	0.65	272	247
Sub-total: **Construction**	44.95	30.12	743.83	89.11	169.44	29.50	2.95	34,357.33	2.40	1.03	34,725.74	31,511.56
Well Workover Operations - Fugitive Dust	0.19	0.02	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	1.60	1.60	22.51	1.49	4.85	1.85	0.18	473.97	0.01	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.70	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	28.52	2.84	0.14	0.00	2.99	0.13	0.01	59.48	0.01	0.02	65	59
Oil - hauling	109.51	10.92	0.92	0.00	0.58	0.12	0.01	267.47	0.01	0.00	268	244
Sub-total: Operations	139.82	15.38	23.57	1.49	8.43	2.10	0.21	801.63	0.03	0.02	808.83	733.97
Road Maintenance	16.71	1.87	4.98	0.13	1.89	0.40	0.04	4.34	601.43	0.01	12,637	11,467
Sub-total: Maintenance	16.71	1.87	4.98	0.13	1.89	0.40	0.04	4.34	601.43	0.01	12,636.82	11,467.17
Total Emissions	201.48	47.37	772.38	90.74	179.77	32.00	3.20	35,163.29	603.87	1.05	48,171.40	43,712.70
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.49. Total Annual Emissions from Oil Wells - Year 2024 - Alternative D - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	4.61	0.69	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring a	28.26	28.22	743.65	89.11	168.77	29.45	2.95	34,300.19	1.63	0.37	34,448	31,260
Commuting Vehicles - Construction	12.08	1.21	0.18	0.00	0.67	0.05	0.00	57.13	0.65	0.65	272	247
Sub-total: **Construction**	44.95	30.12	743.83	89.11	169.44	29.50	2.95	34,357.33	2.40	1.03	34,725.74	31,511.56
Well Workover Operations - Fugitive Dust	0.19	0.02	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	1.60	1.60	22.51	1.49	4.85	1.85	0.18	473.97	0.01	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.70	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	32.94	3.28	0.16	0.00	3.45	0.15	0.02	68.70	0.01	0.02	76	69
Oil - hauling	126.21	12.62	0.78	0.00	0.49	0.10	0.01	226.02	0.01	0.00	227	206
Sub-total: Operations	160.94	17.51	23.45	1.49	8.81	2.10	0.21	769.39	0.03	0.02	777.38	705.43
Road Maintenance	19.30	2.16	5.75	0.156	2.19	0.46	0.05	5.01	694.64	0.01	14,595	13,244
Sub-total: Maintenance	19.30	2.16	5.75	0.16	2.19	0.46	0.05	5.01	694.64	0.01	14,595.40	13,244.46
Total Emissions	225.19	49.79	773.03	90.76	180.44	32.06	3.20	35,131.72	697.08	1.06	50,098.52	45,461.45
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.50. Total Annual Emissions from Oil Wells - Year 2005 - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad Construction - Fugitive Dust	0.00	0.00	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Commuting Vehicles - Construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Sub-total: **Construction**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9,646.70
Well Workover Operations - Fugitive Dust	0.00	0.00	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	473.97	0.00	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	50.00	4.98	0.25	0.00	5.24	0.23	0.02	104.29	0.02	0.03	115	104
Oil - hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Sub-total: Operations	50.00	4.98	0.25	0.00	5.24	0.23	0.02	578.25	0.02	0.03	588.74	534.25
Road Maintenance	29.30	3.27	8.74	0.24	3.32	0.70	0.07	1,061.40	0.01	0.01	1,066	967
Sub-total: Maintenance	29.30	3.27	8.74	0.24	3.32	0.70	0.07	1,061.40	0.01	0.01	1,065.98	967.31
Total Emissions	79.30	8.25	8.98	0.24	8.56	0.94	0.09	1,639.65	0.03	0.05	1,654.72	11,148.26
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.51. Total Annual Emissions from Oil Wells - Year 2015 - Alternative A - Cumulative

	Annual Emissions (Tons)											
Activity	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eqmetricTonnes**	**CO_2eqmetricTonnes**
Well Pad Construction - Fugitive Dust	9.64	1.45	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	59.02	58.93	1,553.14	186.12	352.49	61.51	6.15	71,637.69	3.66	0.79	71,958	65,298
Commuting Vehicles - Construction	25.23	2.54	0.38	0.00	1.40	0.10	0.01	119.32	1.36	1.36	568	516
Sub-total: **Construction**	93.89	62.91	1,550.53	186.12	353.89	61.60	6.16	71,757.01	5.02	2.14	72,526.46	65,813.48
Well Workover Operations - Fugitive Dust	0.40	0.04	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	3.34	3.34	47.01	3.11	10.13	3.86	0.39	473.97	0.03	0.00	475	431
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.03	0.00	0.00	1.47	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eqm-etricTon-nes**	**CO_2eqm-etricTo-nnes**
Well Visits for Inspection & Repair - Operations	56.00	5.58	0.28	0.00	5.87	0.26	0.03	116.81	0.02	0.04	129	117
Oil - hauling	214.74	21.45	1.80	0.01	1.14	0.23	0.02	525.24	0.03	0.00	527	478
Sub-total: Operations	274.48	30.40	49.09	3.12	17.17	4.35	0.44	1,117.48	0.07	0.04	1,131.68	1,026.93
Road Maintenance	32.81	3.67	9.78	0.26	3.72	0.79	0.08	8.51	1,181.03	0.02	24,815	22,518
Sub-total: Maintenance	32.81	3.67	9.78	0.26	3.72	0.79	0.08	8.51	1,181.03	0.02	24,815.10	22,518.24
Total Emissions	401.18	96.98	1,612.40	189.50	374.78	66.75	6.67	72,883.01	1,186.12	2.20	98,473.24	89,358.66
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.52. Total Annual Emissions from Oil Wells - Year 2024 - Alternative A - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad Construction - Fugitive Dust	9.64	1.45	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring a	59.02	58.93	1,553.14	186.12	352.49	61.51	6.15	71,637.69	3.66	0.79	71,958	65,298
Commuting Vehicles - Construction	25.23	2.54	0.38	0.00	1.40	0.10	0.00	119.32	1.36	1.36	568	516
Sub-total: Construction	93.89	62.91	1,553.53	186.12	353.89	61.60	6.15	71,757.01	5.02	2.14	72,526.46	65,813.48
Well Workover Operations - Fugitive Dust	0.40	0.04	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	3.34	3.34	47.01	3.11	10.13	3.86	0.39	473.97	0.03	0.00	475	431
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.03	0.00	0.00	1.47	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	66.51	6.62	0.33	0.00	6.97	0.31	0.03	138.71	0.02	0.04	153	139
Oil - hauling	254.81	25.48	1.61	0.01	1.02	0.21	0.02	468.94	0.02	0.00	471	427
Sub-total: Operations	325.06	35.47	48.95	3.12	18.15	4.38	0.44	1,083.09	0.07	0.05	1,099.30	997.55
Road Maintenance	38.97	4.35	11.62	0.314	4.42	0.94	0.09	10.11	1,402.52	0.02	29,469	26,741
Sub-total: Maintenance	38.97	4.35	11.62	0.31	4.42	0.94	0.09	10.11	1,402.52	0.02	29,468.85	26,741.24
Total Emissions	457.91	102.74	1,614.10	189.55	376.46	66.92	6.68	72,850.21	1,407.61	2.21	103,094.61	93,552.27
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.53. Total Annual Emissions from Oil Wells - Year 2015 - Alternative B - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	4.90	0.73	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	29.99	29.95	789.36	94.59	179.15	31.26	3.13	36,408.89	1.86	0.40	36,572	33,187
Commuting Vehicles - Construction	12.82	1.29	0.20	0.00	0.71	0.05	0.00	60.64	0.69	0.69	289	262
Sub-total: **Construction**	47.72	31.97	789.56	94.59	179.86	31.31	3.13	36,469.54	2.55	1.09	36,860.60	33,448.82
Well Workover Operations - Fugitive Dust	0.20	0.02	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	1.70	1.70	23.89	1.58	5.15	1.96	0.20	473.97	0.01	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.75	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	46.48	4.63	0.23	0.00	4.87	0.22	0.02	96.94	0.01	0.03	107	97
Oil - hauling	178.28	17.80	1.50	0.01	0.95	0.19	0.02	435.93	0.02	0.00	437	397
Sub-total: Operations	226.66	24.15	25.62	1.59	10.98	2.37	0.24	1,007.59	0.05	0.03	1,019.16	924.82
Road Maintenance	27.23	3.04	8.12	0.22	3.09	0.65	0.07	7.07	980.21	0.01	20,596	18,689
Sub-total: Maintenance	27.23	3.04	8.12	0.22	3.09	0.65	0.07	7.07	980.21	0.01	20,595.51	18,689.21
Total Emissions	301.61	59.17	823.30	96.40	193.93	34.34	3.43	37,484.19	982.81	1.14	58,475.27	53,062.85
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.54. Total Annual Emissions from Oil Wells - Year 2024 - Alternative B - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	4.90	0.73	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	29.99	29.95	789.36	94.59	179.15	31.26	3.13	36,408.89	1.86	0.40	36,572	33,187
Commuting Vehicles - Construction	12.82	1.29	0.20	0.00	0.71	0.05	0.00	60.64	0.69	0.69	289	262
Sub-total: **Construction**	47.72	31.97	789.56	94.59	179.86	31.31	3.13	36,469.54	2.55	1.09	36,860.60	33,448.82
Well Workover Operations - Fugitive Dust	0.20	0.02	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	1.70	1.70	23.89	1.58	5.15	1.96	0.20	473.97	0.01	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.75	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	47.46	4.73	0.23	0.00	4.98	0.22	0.02	98.99	0.01	0.03	109	99
Oil - hauling	181.86	18.18	1.61	0.01	1.02	0.21	0.02	468.94	0.02	0.00	471	427
Sub-total: Operations	231.22	24.62	25.74	1.59	11.16	2.39	0.24	1,042.65	0.05	0.03	1,054.53	956.93
Road Maintenance	27.81	3.11	8.29	0.224	3.15	0.67	0.07	7.22	1,000.87	0.01	21,030	19,083
Sub-total: Maintenance	27.81	3.11	8.29	0.22	3.15	0.67	0.07	7.22	1,000.87	0.01	21,029.66	19,083.18
Total Emissions	306.75	59.70	823.59	96.40	194.17	34.37	3.43	37,519.40	1,003.47	1.14	58,946.80	53,488.93
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.55. Total Annual Emissions from Oil Wells - Year 2015 - Alternative C - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad Construction - Fugitive Dust	10.06	1.51	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	61.60	61.51	1,621.09	194.26	367.91	64.20	6.42	74,771.72	3.84	0.82	75,106	68,155
Commuting Vehicles - Construction	26.34	2.65	0.40	0.00	1.46	0.10	0.01	124.54	1.42	1.42	593	538
Sub-total: **Construction**	98.00	65.67	1,621.49	194.26	369.37	64.30	6.43	74,896.26	5.24	2.24	75,699.37	68,692.71
Well Workover Operations - Fugitive Dust	0.42	0.04	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	3.48	3.48	49.06	3.24	10.57	4.03	0.40	473.97	0.03	0.00	475	431
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.03	0.00	0.00	1.53	0.00	0.00	2	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	56.85	5.66	0.28	0.00	5.96	0.27	0.03	118.58	0.02	0.04	131	118
Oil - hauling	217.98	21.78	1.83	0.01	1.16	0.24	0.02	533.19	0.03	0.00	535	485
Sub-total: Operations	278.74	30.96	51.18	3.25	17.72	4.53	0.45	1,127.27	0.07	0.04	1,141.69	1,036.02
Road Maintenance	33.31	3.72	9.93	0.27	3.78	0.80	0.08	8.64	1,198.91	0.02	25,191	22,859
Sub-total: Maintenance	33.31	3.72	9.93	0.27	3.78	0.80	0.08	8.64	1,198.91	0.02	25,190.72	22,859.09
Total Emissions	410.04	100.35	1,682.61	197.78	390.87	69.63	6.96	76,032.17	1,204.22	2.29	102,031.78	92,587.82
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.56. Total Annual Emissions from Oil Wells - Year 2024 - Alternative C - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	10.06	1.51	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	61.60	61.51	1,621.09	194.26	367.91	64.20	6.42	74,771.72	3.82	0.82	75,106	68,155
Commuting Vehicles - Construction	26.34	2.65	0.40	0.00	1.46	0.10	0.00	124.54	1.42	1.42	593	538
Sub-total: **Construction**	98.00	65.67	1,621.49	194.26	369.37	64.30	6.42	74,896.26	5.24	2.24	75,699.37	68,692.71
Well Workover Operations - Fugitive Dust	0.42	0.04	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	3.48	3.48	49.06	3.24	10.57	4.03	0.40	473.97	0.03	0.00	475	431
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.03	0.00	0.00	1.53	0.00	0.00	2	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	68.20	6.79	0.34	0.00	7.15	0.32	0.03	142.25	0.02	0.04	157	142
Oil - hauling	261.31	26.12	1.61	0.01	1.02	0.21	0.02	468.94	0.02	0.00	471	427
Sub-total: Operations	333.41	36.44	51.02	3.25	18.77	4.55	0.46	1,086.69	0.07	0.05	1,103.28	1,001.16
Road Maintenance	39.96	4.46	11.91	0.322	4.53	0.96	0.10	10.37	1,438.28	0.02	30,220	27,423
Sub-total: Maintenance	39.96	4.46	11.91	0.32	4.53	0.96	0.10	10.37	1,438.28	0.02	30,220.08	27,422.94
Total Emissions	471.37	106.57	1,684.42	197.84	392.67	69.81	6.97	75,993.32	1,443.58	2.30	107,022.73	97,116.82
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.57. Total Annual Emissions from Oil Wells - Year 2015 - Alternative D - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad Construction - Fugitive Dust	9.49	1.42	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	58.14	58.06	1,5230.08	183.35	347.25	60.59	6.06	70,573.67	3.60	0.77	70,889	64,328
Commuting Vehicles - Construction	24.86	2.50	0.38	0.00	1.38	0.09	0.01	117.55	1.34	1.34	560	508
Sub-total: **Construction**	92.49	61.98	1,530.45	183.36	348.63	60.69	6.07	70,691.22	4.94	2.11	71,449.24	64,835.97
Well Workover Operations - Fugitive Dust	0.40	0.04	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	3.29	3.29	46.31	3.06	9.98	3.80	0.38	473.97	0.02	0.00	475	431
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.03	0.00	0.00	1.45	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	55.72	5.55	0.28	0.00	5.84	0.26	0.03	116.22	0.02	0.04	128	116
Oil - hauling	213.66	21.34	1.80	0.01	1.14	0.23	0.02	522.61	0.03	0.00	524	476
Sub-total: Operations	273.07	30.22	48.38	3.07	16.98	4.29	0.43	1,114.24	0.07	0.04	1,128.36	1,023.92
Road Maintenance	32.65	3.65	9.73	0.26	3.70	0.79	0.08	8.47	1,175.11	0.02	24,691	22,405
Sub-total: Maintenance	32.65	3.65	9.73	0.26	3.70	0.79	0.08	8.47	1,175.11	0.02	24,690.71	22,405.36
Total Emissions	398.21	95.85	1,588.57	186.69	369.32	65.77	6.58	71,813.93	1,180.13	2.17	97,268.31	88,265.25
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.58. Total Annual Emissions from Oil Wells - Year 2024 - Alternative D - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad Construction - Fugitive Dust	9.49	1.42	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	58.14	58.06	1,530.08	183.35	347.25	60.59	6.06	70,573.67	3.60	0.77	70,889	64,328
Commuting Vehicles - Construction	24.86	2.50	0.38	0.00	1.38	0.09	0.00	117.55	1.34	1.34	560	508
Sub-total: **Construction**	92.49	61.98	1,530.45	183.36	348.63	60.69	6.06	70,691.22	4.94	2.11	71,449.24	64,835.97
Well Workover Operations - Fugitive Dust	0.40	0.04	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	3.29	3.29	46.31	3.06	9.98	3.80	0.38	473.97	0.02	0.00	475	431
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.03	0.00	0.00	1.45	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	65.94	6.57	0.33	0.00	6.91	0.31	0.03	137.54	0.02	0.04	151	137
Oil - hauling	252.66	25.26	1.61	0.01	1.02	0.21	0.02	468.94	0.02	0.00	471	427
Sub-total: Operations	322.29	35.15	48.25	3.07	17.94	4.32	0.43	1,081.90	0.07	0.05	1,097.98	996.35
Road Maintenance	38.64	4.32	11.52	0.312	4.38	0.93	0.09	10.03	1,390.68	0.02	29,220	26,515
Sub-total: Maintenance	38.64	4.32	11.52	0.31	4.38	0.93	0.09	10.03	1,390.68	0.02	29,220.06	26,515.48
Total Emissions	453.42	101.45	1,590.22	186.74	370.95	65.94	6.58	71,783.14	1,395.69	2.18	101,767.28	92,347.80
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.59. Projected Emissions from Coal Production (tpy) for Campbell and Sheridan Counties.

Year	Campbell County	Sheridan County	Total
2005	509	0	509
2015	618	12	630
2024	655	17	672
SO_2			
Year	Campbell County	Sheridan County	Total
2005	19	0	19
2015	23	0.4	23.4
2024	24	0.6	24.6
CO			
Year	Campbell County	Sheridan County	Total
2005	1222	0	1222
2015	1478	29	1507
2024	1568	42	1610
PM_{10}			
Year	Campbell County	Sheridan County	Total
2005	4621	0	4621
2015	5591	109	5700
2024	5930	158	6088
$PM_{2.5}$			
Year	Campbell County	Sheridan County	Total
2005	1426	0	1426
2015	1725	34	1759
2024	1830	49	1879
CH_4			
Year	Campbell County	Sheridan County	Total
2005	322545.11	52430.34	374975.4
2015	390271.118	63442.43	453713.5
2024	413975.22	67306.03	481281.2

Table M.60. Annual Emissions Estimation for Bentonite - Locatable Minerals Equipment Usage - Year 2005

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Exploratory operations	16	2	0	0	0	0	0	35	0	0	35	32
Product Handling, Transfer, and Storage	797	92	---	---	---	---	---	---	---		---	---
Unpaved Roads	12	1	---	---	---	---	---	---	---		---	---
Commuting - Exhaust	0	0	1	0	4	0	0	323	0		324	294
Heavy Equipment - Dust	3	0	---	---	---	---	---	---	---		---	---
Heavy Equipment - Combustive	0	0	7	0	2	1	0	743	0		743	674
Total	828	96	8	0	7	1	0	1,101	0	0	1,102	1,000
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.61. Annual Emissions Estimation for Bentonite - Locatable Minerals Equipment Usage - Year 2015 - Alternative A

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Exploratory operations	16	2	0	0	0	0	0	10	0	0	10	9
Product Handling, Transfer, and Storage	1,576	174	---	---	---	---	---	---	---		---	---
Unpaved Roads	12	1	---	---	---	---	---	---	---		---	---
Commuting - Exhaust	0	0	1	0	4	0	0	323	0		324	294
Heavy Equipment - Dust	4	0	---	---	---	---	---	---	---		---	---
Heavy Equipment - Combustive	0	0	3	0	1	0	0	797	0		797	723
Total	1,608	177	4	0	5	1	0	1,130	0	0	1,130	1,026
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.62. Annual Emissions Estimation for Bentonite - Locatable Minerals Equipment Usage - Year 2024 - Alternative A

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Exploratory operations	16	2	0	0	0	0	0	10	0	0	10	9
Product Handling, Transfer, and Storage	1,576	174	---	---	---	---	---	---	---		---	---
Unpaved Roads	12	1	---	---	---	---	---	---	---		---	---
Commuting - Exhaust	0	0	1	0	4	0	0	323	0		324	294
Heavy Equipment - Dust	4	0	---	---	---	---	---	---	---		---	---
Heavy Equipment - Combustive	0	0	1	0	0	0	0	797	0		797	723
Total	1,608	177	2	0	5	1	0	1,130	0	0	1,130	1,026
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.63. Annual Emissions Estimation for Bentonite - Locatable Minerals Equipment Usage - Year 2015 - Alternative B

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Exploratory operations	8	1	0	0	0	0	0	5	0	0	5	4
Product Handling, Transfer, and Storage	788	87	---	---	---	---	---	---	---		---	---
Unpaved Roads	6	1	---	---	---	---	---	---	---		---	---
Commuting - Exhaust	0	0	1	0	2	0	0	161	0		161	146
Heavy Equipment - Dust	2	0	---	---	---	---	---	---	---		---	---
Heavy Equipment - Combustive	0	0	1	0	0	0	0	397	0		397	361
Total	804	89	2	0	3	0	0	563	0	0	564	511
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.64. Annual Emissions Estimation for Bentonite - Locatable Minerals Equipment Usage - Year 2024 - Alternative B

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Exploratory operations	8	1	0	0	0	0	0	5	0	0	5	4
Product Handling, Transfer, and Storage	788	87	---	---	---	---	---	---	---		---	---
Unpaved Roads	6	1	---	---	---	---	---	---	---		---	---
Commuting - Exhaust	0	0	1	0	2	0	0	161	0		161	146
Heavy Equipment - Dust	2	0	---	---	---	---	---	---	---		---	---
Heavy Equipment - Combustive	0	0	0	0	0	0	0	397	0		398	361
Total	804	89	1	0	2	0	0	563	0	0	564	512
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.65. Annual Emissions Estimation for Bentonite - Locatable Minerals Equipment Usage - Year 2015 - Alternative C

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Exploratory operations	42	5	0	0	0	0	0	25	0	0	25	23
Product Handling, Transfer, and Storage	2,893	411	---	---	---	---	---	---	---		---	---
Unpaved Roads	163	16	---	---	---	---	---	---	---		---	---
Commuting - Exhaust	1	1	14	0	57	4	0	4,281	0		4,287	3,891
Heavy Equipment - Dust	8	1	---	---	---	---	---	---	---		---	---
Heavy Equipment - Combustive	4	4	33	2	13	4	0	10,561	0		10,562	9,584
Total	3,111	438	47	2	70	8	1	14,867	0	0	14,875	13,498
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.66. Annual Emissions Estimation for Bentonite - Locatable Minerals Equipment Usage - Year 2024 - Alternative C

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Exploratory operations	42	5	0	0	0	0	0	25	0	0	25	23
Product Handling, Transfer, and Storage	2,893	411	---	---	---	---	---	---	---		---	---
Unpaved Roads	163	16	---	---	---	---	---	---	---		---	---
Commuting - Exhaust	1	1	14	0	57	4	0	4,281	0		4,287	3,891
Heavy Equipment - Dust	8	1	---	---	---	---	---	---	---		---	---
Heavy Equipment - Combustive	3	3	10	2	4	3	0	10,562	0		10,563	9,585
Total	3,109	437	23	2	61	7	1	14,869	0	0	14,876	13,499
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.67. Annual Emissions Estimation for Bentonite - Locatable Minerals Equipment Usage - Year 2015 - Alternative D

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Exploratory operations	36	4	0	0	0	0	0	22	0	0	22	20
Product Handling, Transfer, and Storage	1,288	212	---	---	---	---	---	---	---		---	---
Unpaved Roads	116	12	---	---	---	---	---	---	---		---	---
Commuting - Exhaust	1	1	10	0	40	3	0	3,032	0		3,036	2,755
Heavy Equipment - Dust	5	0	---	---	---	---	---	---	---		---	---
Heavy Equipment - Combustive	3	3	24	1	9	3	0	7,479	0		7,480	6,788
Total	1,448	231	33	1	50	6	1	10,533	0	0	10,539	9,563
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.68. Annual Emissions Estimation for Bentonite - Locatable Minerals Equipment Usage - Year 2024 - Alternative D

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Exploratory operations	36	4	0	0	0	0	0	22	0	0	22	20
Product Handling, Transfer, and Storage	1,288	212	---	---	---	---	---	---	---		---	---
Unpaved Roads	116	12	---	---	---	---	---	---	---		---	---
Commuting - Exhaust	1	1	10	0	40	3	0	3,032	0		3,036	2,755
Heavy Equipment - Dust	5	0	---	---	---	---	---	---	---		---	---
Heavy Equipment - Combustive	2	2	7	1	3	2	0	7,481	0		7,481	6,789
Total	1,448	230	17	1	43	5	0	10,534	0	0	10,540	9,564
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.69. Total Annual Emissions from Uranium ISL - Year 2005

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	2	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	1	1	17	0	7	2	0	382	0	0	385	349
Wind Erosion	2	0	---	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Construction	5	1	0	0	1	0	0	0	0	---	---	---
Sub-total: Construction	10	2	17	0	7	2	0	382	0	0	385	349
Transport of Ion Exchange Resin	18	2	0	0	0	0	0	0	0		0	0
Well Workover - Operations	7	1	8	0	2	0	0	835	0	0	838	760
Well & Pipeline visits for Inspection & Repair - Operations	2	0	0	0	0	0	0	4	0		4	4

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Operations	26	3	8	0	3	0	0	839	0	0	842	764
Road Maintenance	0	0	0	0	0	0	0	4	0		4	4
Sub-total: Maintenance	0	0	0	0	0	0	0	4	0	0	4	4
Road Reclamation	0	0	0	0	0	0	0	0	0		0	0
Well Pad Reclamation	1	0	0	0	0	0	0	31	0		31	28
Sub-total: Reclamation	1	0	0	0	0	0	0	31	0	0	31	28
Total Emissions	38	5	26	1	10	2	0	1,256	0	0	1,262	1,145
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.70. Total Annual Emissions from Uranium ISL - Year 2015 - Alternative A

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad Construction - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	2	2	21	1	8	2	0	473	0	0	475	431
Wind Erosion	3	0	---	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Construction	6	1	0	0	1	0	0	0	0	---	---	---
Sub-total: Construction	13	3	21	1	9	2	0	473	0	0	475	431
Transport of Ion Exchange Resin	22	2	0	0	0	0	0	185	0		185	168
Well Workover - Operations	7	1	4	0	1	0	0	1,027	0	0	1,031	935
Well & Pipeline visits for Inspection & Repair - Operations	2	0	0	0	0	0	0	5	0		5	5

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Operations	31	3	4	0	1	0	0	1,217	0	0	1,221	1,108
Road Maintenance	0	0	0	0	0	0	0	5	0		5	5
Sub-total: Maintenance	0	0	0	0	0	0	0	5	0	0	5	5
Road Reclamation	0	0	0	0	0	0	0	0	0		0	0
Well Pad Reclamation	1	0	0	0	0	0	0	39	0		39	35
Sub-total: Reclamation	1	0	0	0	0	0	0	39	0	0	39	35
Total Emissions	45	6	25	1	10	2	0	1,734	0	0	1,740	1,579
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.71. Total Annual Emissions from Uranium ISL - Year 2024 - Alternative A

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad & Station Construction - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	2	2	21	1	8	2	0	473	0	0	475	431
Wind Erosion	3	0	---	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Construction	6	1	0	0	1	0	0	0	0	---	---	---
Sub-total: Construction	13	3	21	1	9	2	0	473	0	0	475	431
Transport of Ion Exchange Resin	11	1	0	0	0	0	0	185	0		185	168
Well Workover - Operations	4	1	0	0	0	0	0	514	0	0	515	468
Well & Pipeline visits for Inspection & Repair - Operations	1	0	0	0	0	0	0	3	0		3	2

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Operations	16	2	1	0	0	0	0	701	0	0	703	638
Road Maintenance	0	0	0	0	0	0	0	3	0		3	2
Sub-total: Maintenance	0	0	0	0	0	0	0	3	0	0	3	2
Road Reclamation	0	0	0	0	0	0	0	0	0		0	0
Well Pad Reclamation	1	0	0	0	0	0	0	19	0		19	17
Sub-total: Reclamation	1	0	0	0	0	0	0	19	0	0	19	18
Total Emissions	30	5	22	1	9	2	0	1,196	0	0	1,200	1,089
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.72. Total Annual Emissions from Uranium ISL - Year 2015 - Alternative B

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad Construction - Fugitive Dust	1	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	1	1	11	0	4	1	0	236	0	0	239	217
Wind Erosion	1	0	---	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Construction	3	0	0	0	0	0	0	0	0	---	---	---
Sub-total: Construction	6	1	11	0	4	1	0	236	0	0	239	217
Transport of Ion Exchange Resin	11	1	0	0	0	0	0	92	0		92	84
Well Workover - Operations	3	0	2	0	1	0	0	513	0	0	515	467
Well & Pipeline visits for Inspection & Repair - Operations	1	0	0	0	0	0	0	3	0		3	2

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Operations	16	2	2	0	1	0	0	608	0	0	610	554
Road Maintenance	0	0	0	0	0	0	0	3	0		3	2
Sub-total: Maintenance	0	0	0	0	0	0	0	3	0	0	3	2
Road Reclamation	0	0	0	0	0	0	0	0	0		0	0
Well Pad Reclamation	1	0	0	0	0	0	0	19	0		19	18
Sub-total: Reclamation	1	0	0	0	0	0	0	19	0	0	19	18
Total Emissions	23	3	13	0	5	1	0	867	0	0	871	790
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.73. Total Annual Emissions from Uranium ISL - Year 2024 - Alternative B

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	1	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	1	1	11	0	4	1	0	236	0	0	239	217
Wind Erosion	1	0	---	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Construction	3	0	0	0	0	0	0	0	0	---	---	---
Sub-total: Construction	6	1	11	0	4	1	0	236	0	0	239	217
Transport of Ion Exchange Resin	6	1	0	0	0	0	0	92	0		92	84
Well Workover - Operations	2	0	0	0	0	0	0	257	0	0	258	234
Well & Pipeline visits for Inspection & Repair - Operations	1	0	0	0	0	0	0	1	0		1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Operations	8	1	0	0	0	0	0	350	0	0	351	319
Road Maintenance	0	0	0	0	0	0	0	1	0		1	1
Sub-total: Maintenance	0	0	0	0	0	0	0	1	0	0	1	1
Road Reclamation	0	0	0	0	0	0	0	0	0		0	0
Well Pad Reclamation	0	0	0	0	0	0	0	10	0		10	9
Sub-total: Reclamation	0	0	0	0	0	0	0	10	0	0	10	9
Total Emissions	15	2	11	0	5	1	0	598	0	0	601	545
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.74. Total Annual Emissions from Uranium ISL - Year 2015 - Alternative C

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad Construction - Fugitive Dust	5	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	3	3	37	1	14	3	0	830	0	0	833	756
Wind Erosion	4	1	---	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Construction	11	1	0	0	1	0	0	0	0	---	---	---
Sub-total: Construction	23	5	37	1	16	3	0	830	0	0	833	756
Transport of Ion Exchange Resin	39	4	0	0	0	0	0	323	0		323	293
Well Workover - Operations	12	2	7	0	2	1	0	1,797	0	0	1,804	1,637
Well & Pipeline visits for Inspection & Repair - Operations	4	0	0	0	0	0	0	9	0		9	8

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Operations	54	6	7	0	2	1	0	2,129	0	0	2,136	1,938
Road Maintenance	0	0	0	0	0	0	0	9	0		9	8
Sub-total: Maintenance	0	0	0	0	0	0	0	9	0	0	9	8
Road Reclamation	0	0	0	0	0	0	0	0	0		0	0
Well Pad Reclamation	2	0	0	0	0	0	0	68	0		68	62
Sub-total: Reclamation	2	0	0	0	0	0	0	68	0	0	68	62
Total Emissions	80	11	44	1	18	4	0	3,036	0	0	3,046	2,764
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.75. Total Annual Emissions from Uranium ISL - Year 2024 - Alternative C

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad & Station Construction - Fugitive Dust	5	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	3	3	37	1	14	3	0	830	0	0	833	756
Wind Erosion	4	1	---	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Construction	11	1	0	0	1	0	0	0	0	---	---	---
Sub-total: Construction	23	5	37	1	16	3	0	830	0	0	833	756
Transport of Ion Exchange Resin	19	2	0	0	0	0	0	323	0		323	293
Well Workover - Operations	7	1	1	0	0	0	0	899	0	0	902	818
Well & Pipeline visits for Inspection & Repair - Operations	2	0	0	0	0	0	0	5	0		5	4

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Operations	28	3	1	0	1	0	0	1,226	0	0	1,230	1,116
Road Maintenance	0	0	0	0	0	0	0	4	0		4	4
Sub-total: Maintenance	0	0	0	0	0	0	0	4	0	0	4	4
Road Reclamation	0	0	0	0	0	0	0	0	0		0	0
Well Pad Reclamation	1	0	0	0	0	0	0	34	0		34	31
Sub-total: Reclamation	1	0	0	0	0	0	0	34	0	0	34	31
Total Emissions	52	8	38	1	16	4	0	2,094	0	0	2,101	1,907
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.76. Total Annual Emissions from Uranium ISL - Year 2015 - Alternative D

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad Construction - Fugitive Dust	4	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	2	2	32	1	12	3	0	714	0	0	717	651
Wind Erosion	4	1	---	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Construction	9	1	0	0	1	0	0	0	0	---	---	---
Sub-total: Construction	20	4	32	1	13	3	0	714	0	0	717	651
Transport of Ion Exchange Resin	33	3	0	0	0	0	0	277	0		277	251
Well Workover - Operations	10	1	6	0	2	0	0	1,541	0	0	1,546	1,403
Well & Pipeline visits for Inspection & Repair - Operations	3	0	0	0	0	0	0	8	0		8	7

Activity	Annual Emissions (Tons)											
	PM_{10}	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Sub-total: Operations	47	5	6	0	2	1	0	1,825	0	0	1,831	1,661
Road Maintenance	0	0	0	0	0	0	0	8	0		8	7
Sub-total: Maintenance	0	0	0	0	0	0	0	8	0	0	8	7
Road Reclamation	0	0	0	0	0	0	0	0	0		0	0
Well Pad Reclamation	2	0	0	0	0	0	0	58	0		58	53
Sub-total: Reclamation	2	0	0	0	0	0	0	58	0	0	58	53
Total Emissions	68	10	38	1	16	4	0	2,605	0	0	2,614	2,372
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.77. Total Annual Emissions from Uranium ISL - Year 2024 - Alternative D

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	4	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	2	2	32	1	12	3	0	714	0	0	717	651
Wind Erosion	4	1	---	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Construction	9	1	0	0	1	0	0	0	0	---	---	---
Sub-total: Construction	20	4	32	1	13	3	0	714	0	0	717	651
Transport of Ion Exchange Resin	17	2	0	0	0	0	0	277	0		277	251
Well Workover - Operations	6	1	1	0	0	0	0	770	0	0	773	702
Well & Pipeline visits for Inspection & Repair - Operations	2	0	0	0	0	0	0	4	0		4	4

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Operations	24	3	1	0	1	0	0	1,051	0	0	1,054	957
Road Maintenance	0	0	0	0	0	0	0	4	0		4	3
Sub-total: Maintenance	0	0	0	0	0	0	0	4	0	0	4	3
Road Reclamation	0	0	0	0	0	0	0	0	0		0	0
Well Pad Reclamation	1	0	0	0	0	0	0	29	0		29	26
Sub-total: Reclamation	1	0	0	0	0	0	0	29	0	0	29	26
Total Emissions	45	7	33	1	14	3	0	1,798	0	0	1,804	1,637
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.78. Annual Emissions Estimation for Locatable Minerals Equipment Usage - Year 2005

Activity	Annual Emissions (Tons)										
	PM_{10}	$PM_{2.5}$a	NOx	SO_2	CO	VOC	HAPsa	CO_2	CH_4	CO_2eq	CO_2eqmetric tonnes
Product Handling, Transfer, and Storage	15	2	---	---	---	---	---	---	---	---	---
Unpaved Roads	662	66	---	---	---	---	---	---	---	---	---
Commuting - Exhaust	0	0	2	0	5	2	0	466	0	467	423
Heavy Equipment - Dust	22	2	---	---	---	---	---	---	---	---	---
Heavy Equipment - Combustive	11	10	170	4	76	11	1	17,704	0	17,707	16,068
Wind Erosion	53	8	---	---	---	---	---	---	---	---	---
Total	763	89	172	4	80	13	1	18,170	0	18,174	16,492
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.79. Annual Emissions Estimation for Locatable Minerals Equipment Usage - Year 2015 - Alternative A

Activity	Annual Emissions (Tons)										
	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPsa	CO_2	CH_4	CO_2eq	CO_2eqmetric tonnes
Product Handling, Transfer, and Storage	16	2	---	---	---	---	---	---	---	---	---
Unpaved Roads	662	66	---	---	---	---	---	---	---	---	---
Commuting - Exhaust	0	0	2	0	5	2	0	466	0	467	423
Heavy Equipment - Dust	44	4	---	---	---	---	---	---	---	---	---
Heavy Equipment - Combustive	6	6	63	3	28	6	1	17,968	0	17,970	16,307
Wind Erosion	106	16	---	---	---	---	---	---	---	---	---
Total	835	95	65	3	33	8	1	18,435	0	18,437	16,731
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.80. Annual Emissions Estimation for Locatable Minerals Equipment Usage - Year 2024 - Alternative A

Activity	Annual Emissions (Tons)										
	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPsa	CO_2	CH_4	CO_2eq	CO_2eqmetric tonnes
Product Handling, Transfer, and Storage	15	2	---	---	---	---	---	---	---	---	---
Unpaved Roads	662	66	---	---	---	---	---	---	---	---	---
Commuting - Exhaust	0	0	2	0	5	2	0	466	0	467	423
Heavy Equipment - Dust	44	4	---	---	---	---	---	---	---	---	---
Heavy Equipment - Combustive	5	5	19	3	10	5	0	17,972	0	17,974	16,310
Wind Erosion	89	13	---	---	---	---	---	---	---	---	---
Total	816	91	21	3	14	7	1	18,439	0	18,441	16,734
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.81. Annual Emissions Estimation for Locatable Minerals Equipment Usage - Year 2015 - Alternative B

Activity	Annual Emissions (Tons)										
	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPsa	CO_2	CH_4	CO_2eq	CO_2eqmetric tonnes
Product Handling, Transfer, and Storage	5	1	---	---	---	---	---	---	---	---	---
Unpaved Roads	208	21	---	---	---	---	---	---	---	---	---
Commuting - Exhaust	0	0	1	0	1	1	0	147	0	147	133
Heavy Equipment - Dust	5	0	---	---	---	---	---	---	---	---	---
Heavy Equipment - Combustive	2	2	20	1	9	2	0	5,646	0	5,647	5,124
Wind Erosion	11	2	---	---	---	---	---	---	---	---	---
Total	231	26	21	1	10	3	0	5,793	0	5,793	5,257
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.82. Annual Emissions Estimation for Locatable Minerals Equipment Usage - Year 2024 - Alternative B

Activity	Annual Emissions (Tons)										
	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPsa	CO_2	CH_4	CO_2eq	CO_2eqmetric tonnes
Product Handling, Transfer, and Storage	5	1	---	---	---	---	---	---	---	---	---
Unpaved Roads	208	21	---	---	---	---	---	---	---	---	---
Commuting - Exhaust	0	0	1	0	1	1	0	147	0	147	133
Heavy Equipment - Dust	5	0	---	---	---	---	---	---	---	---	---
Heavy Equipment - Combustive	1	1	6	1	3	2	0	5,647	0	5,648	5,125
Wind Erosion	10	1	---	---	---	---	---	---	---	---	---
Total	229	25	7	1	4	2	0	5,794	0	5,794	5,258
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.83. Annual Emissions Estimation for Locatable Minerals Equipment Usage - Year 2015 - Alternative C

Activity	Annual Emissions (Tons)										
	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPsa	CO_2	CH_4	CO_2eq	CO_2eqmetric tonnes
Product Handling, Transfer, and Storage	63	9	---	---	---	---	---	---	---	---	---
Unpaved Roads	2,642	264	---	---	---	---	---	---	---	---	---
Commuting - Exhaust	1	0	9	0	18	8	1	1,861	0	1,862	1,690
Heavy Equipment - Dust	87	9	---	---	---	---	---	---	---	---	---
Heavy Equipment - Combustive	25	24	252	13	113	25	2	71,695	0	71,703	65,066
Wind Erosion	209	31	---	---	---	---	---	---	---	---	---
Total	3,027	339	261	13	131	32	3	73,556	0	73,565	66,756
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.84. Annual Emissions Estimation for Locatable Minerals Equipment Usage - Year 2024 - Alternative C

Activity	Annual Emissions (Tons)										
	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPsa	CO_2	CH_4	CO_2eq	CO_2eqmetric tonnes
Product Handling, Transfer, and Storage	61	9	---	---	---	---	---	---	---	---	---
Unpaved Roads	2,642	264	---	---	---	---	---	---	---	---	---
Commuting - Exhaust	1	0	9	0	18	8	1	1,861	0	1,862	1,690
Heavy Equipment - Dust	87	9	---	---	---	---	---	---	---	---	---
Heavy Equipment - Combustive	19	18	76	11	38	20	2	71,710	0	71,716	65,078
Wind Erosion	176	26	---	---	---	---	---	---	---	---	---
Total	2,986	327	85	11	56	27	3	73,571	0	73,578	66,768
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.85. Annual Emissions Estimation for Locatable Minerals Equipment Usage - Year 2015 - Alternative D

Activity	Annual Emissions (Tons)										
	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPsa	CO_2	CH_4	CO_2eq	CO_2eqmetric tonnes
Product Handling, Transfer, and Storage	32	5	---	---	---	---	---	---	---	---	---
Unpaved Roads	1,358	136	---	---	---	---	---	---	---	---	---
Commuting - Exhaust	0	0	5	0	9	4	0	956	0	957	868
Heavy Equipment - Dust	50	5	---	---	---	---	---	---	---	---	---
Heavy Equipment - Combustive	13	13	130	7	58	13	1	36,833	0	36,837	33,428
Wind Erosion	119	18	---	---	---	---	---	---	---	---	---
Total	1,572	176	134	7	67	17	2	37,789	0	37,794	34,296
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.86. Annual Emissions Estimation for Locatable Minerals Equipment Usage - Year 2024 - Alternative D

Activity	Annual Emissions (Tons)										
	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPsa	CO_2	CH_4	CO_2eq	CO_2eqmetric tonnes
Product Handling, Transfer, and Storage	31	5	---	---	---	---	---	---	---	---	---
Unpaved Roads	1,358	136	---	---	---	---	---	---	---	---	---
Commuting - Exhaust	0	0	5	0	9	4	0	956	0	957	868
Heavy Equipment - Dust	50	5	---	---	---	---	---	---	---	---	---
Heavy Equipment - Combustive	10	9	39	6	20	10	1	36,841	0	36,844	33,434
Wind Erosion	100	15	---	---	---	---	---	---	---	---	---
Total	1,549	170	44	6	29	14	1	37,797	0	37,801	34,302
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.87. Total Annual Emissions from Fire Management Projects - Year 2005

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Fugitive Dust and Smoke	71	60	20	6	685	36	4	0	37	2	1,488	1,351
Heavy Equipment Exhaust	0	0	0	0	0	0	0	6	0		6	6
Commuting Vehicles - Fugitive Dust	2	0	---	---	---	---	---	---	---		---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	7	0		7	7
Total	73	60	20	6	685	36	4	13	37	2	1,502	1,363
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.88. Total Annual Emissions from Fire Management Projects - Year 2015 - Alternative A

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Fugitive Dust and Smoke	150	126	43	12	1,448	75	8	0	79	5	3,148	2,856
Heavy Equipment Exhaust	0	0	0	0	0	0	0	4	0		4	4
Commuting Vehicles - Fugitive Dust	1	0	---	---	---	---	---	---	---		---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	5	0		5	4
Total	151	126	43	12	1,448	75	8	9	79	5	3,157	2,865
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.89. Total Annual Emissions from Fire Management Projects - Year 2024 - Alternative A

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Fugitive Dust and Smoke	150	126	43	12	1,448	75	8	0	79	5	3,148	2,856
Heavy Equipment Exhaust	0	0	0	0	0	0	0	4	0		4	4
Commuting Vehicles - Fugitive Dust	1	0	---	---	---	---	---	---	---		---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	5	0		5	4
Total	151	126	43	12	1,448	75	8	9	79	5	3,157	2,865
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.90. Total Annual Emissions from Fire Management Projects - Year 2015 - Alternative B

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Fugitive Dust and Smoke	37	32	11	3	362	19	2	0	20	1	787	714
Heavy Equipment Exhaust	0	0	0	0	0	0	0	1	0		1	0
Commuting Vehicles - Fugitive Dust	0	0	---	---	---	---	---	---	---		---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	1	0		1	1
Total	38	32	11	3	362	19	2	1	20	1	788	715
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.91. Total Annual Emissions from Fire Management Projects - Year 2024 - Alternative B

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Fugitive Dust and Smoke	37	32	11	3	362	19	2	0	20	1	787	714
Heavy Equipment Exhaust	0	0	0	0	0	0	0	1	0		1	0
Commuting Vehicles - Fugitive Dust	0	0	---	---	---	---	---	---	---		---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	1	0		1	1
Total	38	32	11	3	362	19	2	1	20	1	788	715
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.92. Total Annual Emissions from Fire Management Projects - Year 2015 - Alternative C

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Fugitive Dust and Smoke	450	379	128	35	4,343	225	23	0	236	14	9,443	8,569
Heavy Equipment Exhaust	0	0	0	0	1	0	0	12	0		12	11
Commuting Vehicles - Fugitive Dust	4	0	---	---	---	---	---	---	---		---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	14	0		14	13
Total	453	379	128	35	4,343	225	23	27	236	14	9,470	8,594
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.93. Total Annual Emissions from Fire Management Projects - Year 2024 - Alternative C

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Fugitive Dust and Smoke	450	379	128	35	4,343	225	23	0	236	14	9,443	8,569
Heavy Equipment Exhaust	0	0	0	0	1	0	0	12	0		12	11
Commuting Vehicles - Fugitive Dust	4	0	---	---	---	---	---	---	---		---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	14	0		14	13
Total	453	379	128	35	4,343	225	23	27	236	14	9,470	8,594
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.94. Total Annual Emissions from Fire Management Projects - Year 2015 - Alternative D

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Fugitive Dust and Smoke	150	126	43	12	1,448	75	8	0	79	5	3,148	2,856
Heavy Equipment Exhaust	0	0	0	0	0	0	0	4	0		4	4
Commuting Vehicles - Fugitive Dust	1	0	---	---	---	---	---	---	---		---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	5	0		5	4
Total	151	126	43	12	1,448	75	8	9	79	5	3,157	2,865
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.95. Total Annual Emissions from Fire Management Projects - Year 2024 - Alternative D

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Fugitive Dust and Smoke	150	126	43	12	1,448	75	8	0	79	5	3,148	2,856
Heavy Equipment Exhaust	0	0	0	0	0	0	0	4	0		4	4
Commuting Vehicles - Fugitive Dust	1	0	---	---	---	---	---	---	---		---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	5	0		5	4
Total	151	126	43	12	1,448	75	8	9	79	5	3,157	2,865
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.96. Total Annual Emissions from Forest and Woodlands Projects - Year 2005

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO_2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eqtons**	**CO_2eqmetric tonnes**
Heavy Equipment - Fugitive Dust	32	3	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	2	0	0	10	0	10	9
Sub-total: Heavy Equipment	32	3	0	0	2	0	0	10	0	10	9
Commuting Vehicles - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	19	0	19	17
Sub-total: Commuting Vehicles	6	1	0	0	0	0	0	19	0	19	17
Total	37	4	0	0	2	1	0	29	0	29	27
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.97. Total Annual Emissions from Forest and Woodlands Projects - Year 2015 - Alternative A

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO_2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eqtons**	**CO_2eqmetric tonnes**
Heavy Equipment - Fugitive Dust	29	3	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	2	0	0	10	0	10	9
Sub-total: Heavy Equipment	29	3	0	0	2	0	0	10	0	10	9
Commuting Vehicles - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	19	0	19	17
Sub-total: Commuting Vehicles	6	1	0	0	0	0	0	19	0	19	17
Total	35	4	0	0	2	1	0	29	0	29	27
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.98. Total Annual Emissions from Forest and Woodlands Projects - Year 2024 - Alternative A

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO_2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eqtons**	**CO_2eqmetric tonnes**
Heavy Equipment - Fugitive Dust	29	3	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	2	0	0	10	0	10	9
Sub-total: Heavy Equipment	29	3	0	0	2	0	0	10	0	10	9
Commuting Vehicles - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	19	0	19	17
Sub-total: Commuting Vehicles	6	1	0	0	0	0	0	19	0	19	17
Total	35	4	0	0	2	1	0	29	0	29	27
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.99. Total Annual Emissions from Forest and Woodlands Projects - Year 2015 - Alternative B

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO_2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eqtons**	**CO_2eqmetric tonnes**
Heavy Equipment - Fugitive Dust	25	2	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	2	0	0	10	0	10	9
Sub-total: Heavy Equipment	25	3	0	0	2	0	0	10	0	10	9
Commuting Vehicles - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	19	0	19	17
Sub-total: Commuting Vehicles	6	1	0	0	0	0	0	19	0	19	17
Total	30	3	0	0	2	1	0	29	0	29	27
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.100. Total Annual Emissions from Forest and Woodlands Projects - Year 2024 - Alternative B

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO_2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eqtons**	**CO_2eqmetric tonnes**
Heavy Equipment - Fugitive Dust	25	2	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	2	0	0	10	0	10	9
Sub-total: Heavy Equipment	25	3	0	0	2	0	0	10	0	10	9
Commuting Vehicles - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	19	0	19	17
Sub-total: Commuting Vehicles	6	1	0	0	0	0	0	19	0	19	17
Total	30	3	0	0	2	1	0	29	0	29	27
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.101. Total Annual Emissions from Forest and Woodlands Projects - Year 2015 - Alternative C

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO_2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eqtons**	**CO_2eqmetric tonnes**
Heavy Equipment - Fugitive Dust	188	19	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	2	0	0	10	0	10	9
Sub-total: Heavy Equipment	189	19	0	0	2	0	0	10	0	10	9
Commuting Vehicles - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	19	0	19	17
Sub-total: Commuting Vehicles	6	1	0	0	0	0	0	19	0	19	17
Total	194	19	0	0	2	1	0	29	0	29	27
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.102. Total Annual Emissions from Forest and Woodlands Projects - Year 2024 - Alternative C

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO_2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eqtons**	**CO_2eqmetric tonnes**
Heavy Equipment - Fugitive Dust	188	19	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	2	0	0	10	0	10	9
Sub-total: Heavy Equipment	189	19	0	0	2	0	0	10	0	10	9
Commuting Vehicles - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	19	0	19	17
Sub-total: Commuting Vehicles	6	1	0	0	0	0	0	19	0	19	17
Total	194	20	0	0	2	1	0	29	0	29	27
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.103. Total Annual Emissions from Forest and Woodlands Projects - Year 2015 - Alternative D

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO_2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eqtons**	**CO_2eqmetric tonnes**
Heavy Equipment - Fugitive Dust	79	8	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	2	0	0	10	0	10	9
Sub-total: Heavy Equipment	79	8	0	0	2	0	0	10	0	10	9
Commuting Vehicles - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	19	0	19	17
Sub-total: Commuting Vehicles	6	1	0	0	0	0	0	19	0	19	17
Total	85	9	0	0	2	1	0	29	0	29	27
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.104. Total Annual Emissions from Forest and Woodlands Projects - Year 2024 - Alternative D

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO_2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eqtons**	**CO_2eqmetric tonnes**
Heavy Equipment - Fugitive Dust	79	8	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	2	0	0	10	0	10	9
Sub-total: Heavy Equipment	79	8	0	0	2	0	0	10	0	10	9
Commuting Vehicles - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	19	0	19	17
Sub-total: Commuting Vehicles	6	1	0	0	0	0	0	19	0	19	17
Total	85	9	0	0	2	1	0	29	0	29	27
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.105. Total Annual Emissions from Renewable Energy Development - Year 2005

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eq**	**CO2eqmetricTonnes**
Fugitive Dust	20	2	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	1	1	14	0	6	1	0	1,427	0	1,427	1,295
Sub-total: Heavy Equipment	21	3	14	0	6	1	0	1,427	0	1,427	1,295
Commuting Vehicles - Fugitive Dust	18	2	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	1	0	0	81	0	81	74
Sub-total: Commuting Vehicles	18	2	0	0	1	0	0	81	0	81	74
Total	39	5	14	0	7	1	0	1,508	0	1,508	1,369
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.106. Total Annual Emissions from Renewable Energy Development - Year 2015 - Alternative A

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	0	4	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	2	0	1	0	0	504	0	504	457
Sub-total: Heavy Equipment	37	4	2	0	1	0	0	504	0	504	457
Commuting Vehicles - Fugitive Dust	8	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	39	0	39	36
Sub-total: Commuting Vehicles	8	1	0	0	0	0	0	39	0	39	36
Total	45	5	2	0	1	0	0	543	0	543	493
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.107. Total Annual Emissions from Renewable Energy Development - Year 2024 - Alternative A

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eq**	**CO2eqmetricTonnes**
Fugitive Dust	90	9	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	2	0	1	0	0	1,561	0	1,561	1,417
Sub-total: Heavy Equipment	90	9	2	0	1	0	0	1,561	0	1,561	1,417
Commuting Vehicles - Fugitive Dust	21	2	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	1	0	0	97	0	97	88
Sub-total: Commuting Vehicles	21	2	0	0	1	0	0	97	0	97	88
Total	111	11	2	0	2	1	0	1,658	0	1,658	1,505
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.108. Total Annual Emissions from Renewable Energy Development - Year 2015 - Alternative B

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	25	2	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	2	0	1	0	0	477	0	477	433
Sub-total: Heavy Equipment	25	3	2	0	1	0	0	477	0	477	433
Commuting Vehicles - Fugitive Dust	7	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	31	0	31	28
Sub-total: Commuting Vehicles	7	1	0	0	0	0	0	31	0	31	28
Total	32	3	2	0	1	0	0	508	0	508	461
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.109. Total Annual Emissions from Renewable Energy Development - Year 2024 - Alternative B

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO_2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eq**	**CO_2eqmet-ricTonnes**
Fugitive Dust	25	2	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	1	0	0	0	0	533	0	533	484
Sub-total: Heavy Equipment	25	3	1	0	0	0	0	533	0	533	484
Commuting Vehicles - Fugitive Dust	7	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	31	0	31	28
Sub-total: Commuting Vehicles	7	1	0	0	0	0	0	31	0	31	28
Total	32	3	1	0	1	0	0	564	0	564	512
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.110. Total Annual Emissions from Renewable Energy Development - Year 2015 - Alternative C

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	166	17	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	1	1	8	0	3	1	0	1955	0	1955	1774
Sub-total: Heavy Equipment	167	17	8	0	3	1	0	1955	0	1955	1774
Commuting Vehicles - Fugitive Dust	30	3	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	1	1	0	139	0	139	126
Sub-total: Commuting Vehicles	30	3	0	0	1	1	0	139	0	139	126
Total	196	20	8	0	4	1	0	2094	0	2094	1900
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.111. Total Annual Emissions from Renewable Energy Development - Year 2024 - Alternative C

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eq**	**CO2eqmetricTonnes**
Fugitive Dust	166	17	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	1	1	2	0	1	1	0	2128	0	2128	1931
Sub-total: Heavy Equipment	166	17	2	0	1	1	0	2128	0	2128	1931
Commuting Vehicles - Fugitive Dust	30	3	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	1	1	0	139	0	139	126
Sub-total: Commuting Vehicles	30	3	0	0	1	1	0	139	0	139	126
Total	196	20	3	0	2	1	0	2267	0	2268	2058
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.112. Total Annual Emissions from Renewable Energy Development - Year 2015 - Alternative D

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	282	28	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	1	1	7	0	3	1	0	1731	0	1731	1571
Sub-total: Heavy Equipment	283	29	7	0	3	1	0	1731	0	1731	1571
Commuting Vehicles - Fugitive Dust	28	3	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	1	0	0	140	0	140	127
Sub-total: Commuting Vehicles	28	3	0	0	1	0	0	140	0	140	127
Total	311	32	7	0	4	1	0	1871	0	1871	1698
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.113. Total Annual Emissions from Renewable Energy Development - Year 2024 - Alternative D

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eq**	**CO2eqmetricTonnes**
Fugitive Dust	282	28	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	1	0	2	0	1	1	0	1899	0	1899	1723
Sub-total: Heavy Equipment	283	29	2	0	1	1	0	1899	0	1899	1723
Commuting Vehicles - Fugitive Dust	28	3	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	1	0	0	140	0	140	127
Sub-total: Commuting Vehicles	28	3	0	0	1	0	0	140	0	140	127
Total	311	32	3	0	2	1	0	2039	0	2039	1850
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.114. Total Annual Emissions from Road Maintenance Projects - Year 2005

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Road Maintenance	0	0	0	0	0	0	0	4	0	4	4
Motorized Recreation	18	17	11	2	1,331	638	64	7,961	8	8,128	7,376
Total	18	17	11	2	1,331	638	64	7,965	8	8,132	7,379
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.115. Total Annual Emissions from Road Maintenance Projects - Year 2015 - Alternative A

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Road Maintenance	0	0	0	0	0	0	0	4	0	4	4
Motorized Recreation	16	15	22	2	1,559	548	55	11,795	7	11,948	10,842
Total	17	15	22	2	1,559	548	55	11,799	7	11,952	10,846
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.116. Total Annual Emissions from Road Maintenance Projects - Year 2024 - Alternative A

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Road Maintenance	0	0	0	0	0	0	0	4	0	4	4
Motorized Recreation	11	10	30	3	1,463	371	37	13,127	6	13,243	12,017
Total	11	10	30	3	1,463	371	37	13,131	6	13,247	12,021
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.117. Total Annual Emissions from Road Maintenance Projects - Year 2015 - Alternative B

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Road Maintenance	0	0	0	0	0	0	0	4	0	4	4
Motorized Recreation	16	15	22	2	1,559	548	55	11,795	7	11,948	10,842
Total	17	15	22	2	1,559	548	55	11,799	7	11,952	10,846
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.118. Total Annual Emissions from Road Maintenance Projects - Year 2024 - Alternative B

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Road Maintenance	0	0	0	0	0	0	0	4	0	4	4
Motorized Recreation	11	10	30	3	1,463	371	37	13,127	6	13,243	12,017
Total	11	10	30	3	1,463	371	37	13,131	6	13,247	12,021
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.119. Total Annual Emissions from Road Maintenance Projects - Year 2015 - Alternative C

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Road Maintenance	0	0	0	0	0	0	0	5	0	5	4
Motorized Recreation	16	15	22	2	1,559	548	55	11,795	7	11,948	10,842
Total	17	15	22	2	1,559	548	55	11,800	7	11,953	10,847
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.120. Total Annual Emissions from Road Maintenance Projects - Year 2024 - Alternative C

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Road Maintenance	0	0	0	0	0	0	0	5	0	5	4
Motorized Recreation	11	10	30	3	1,463	371	37	13,127	6	13,243	12,017
Total	11	10	30	3	1,463	371	37	13,132	6	13,248	12,022
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.121. Total Annual Emissions from Road Maintenance Projects - Year 2015 - Alternative D

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Road Maintenance	0	0	0	0	0	0	0	5	0	5	4
Motorized Recreation	16	15	22	2	1,559	548	55	11,795	7	11,948	10,842
Total	17	15	22	2	1,559	548	55	11,800	7	11,953	10,847
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.122. Total Annual Emissions from Road Maintenance Projects - Year 2024 - Alternative D

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Road Maintenance	0	0	0	0	0	0	0	5	0	5	4
Motorized Recreation	11	10	30	3	1,463	371	37	13,127	6	13,243	12,017
Total	11	10	30	3	1,463	371	37	13,132	6	13,248	12,022
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.123. Total Annual Emissions from Livestock Grazing Projects - Year 2005

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	0	0	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	0	0	0	7	0	7	6
Sub-total: Construction	0	0	0	0	0	0	0	7	0	7	6
Commuting Vehicles - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	3	0	0	68	0	68	62
Enteric Fermentation and Manure	---	---	---	---	---	---	---		389	8,178	7,421
Sub-total: Operations and Maintenance	3	0	0	0	3	0	0	68	389	8,246	7,483
Total	3	0	0	0	3	0	0	75	389	8,253	7,489
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.124. Total Annual Emissions from Livestock Grazing Projects - Year 2015 - Alternative A

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	0	0	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	0	0	0	7	0	7	6
Sub-total: Construction	0	0	0	0	0	0	0	7	0	7	6
Commuting Vehicles - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	3	0	0	68	0	68	62
Enteric Fermentation and Manure	---	---	---	---	---	---	---		389	8,178	7,421
Sub-total: Operations and Maintenance	3	0	0	0	3	0	0	68	389	8,246	7,483
Total	3	0	0	0	3	0	0	75	389	8,253	7,490
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.125. Total Annual Emissions from Livestock Grazing Projects - Year 2024 - Alternative A

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	0	0	0	0	0	0	0	7	0	7	6
Heavy Equipment - Vehicle Exhaust	0	0	0	0	0	0	0	7	0	7	6
Sub-total: Construction	3	0	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Fugitive Dust	0	0	0	0	3	0	0	68	0	68	62
Commuting Vehicles - Vehicle Exhaust	---	---	---	---	---	---	---		389	8,178	7,421
Enteric Fermentation and Manure	3	0	0	0	3	0	0	68	389	8,246	7,483
Sub-total: Operations and Maintenance	3	0	0	0	3	0	0	75	389	8,253	7,490
Total	80	8	4	0	86	4	0	1,818	1,187	26,742	24,267
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.126. Total Annual Emissions from Livestock Grazing Projects - Year 2015 - Alternative B

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	0	0	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	0	0	0	8	0	8	7
Sub-total: Construction	0	0	0	0	0	0	0	8	0	8	7
Commuting Vehicles - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	3	0	0	68	0	68	62
Enteric Fermentation and Manure	---	---	---	---	---	---	---		389	8,178	7,421
Sub-total: Operations and Maintenance	3	0	0	0	3	0	0	68	389	8,247	7,483
Total	3	0	0	0	3	0	0	76	389	8,254	7,490
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.127. Total Annual Emissions from Livestock Grazing Projects - Year 2024 - Alternative B

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	0	0	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	0	0	0	8	0	8	7
Sub-total: Construction	0	0	0	0	0	0	0	8	0	8	7
Commuting Vehicles - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	3	0	0	68	0	68	62
Enteric Fermentation and Manure	---	---	---	---	---	---	---		389	8,178	7,421
Sub-total: Operations and Maintenance	3	0	0	0	3	0	0	68	389	8,247	7,483
Total	3	0	0	0	3	0	0	76	389	8,254	7,490
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.128. Total Annual Emissions from Livestock Grazing Projects - Year 2015 - Alternative C

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	0	0	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	0	0	0	8	0	8	7
Sub-total: Construction	0	0	0	0	0	0	0	8	0	8	7
Commuting Vehicles - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	3	0	0	68	0	68	62
Enteric Fermentation and Manure	---	---	---	---	---	---	---		389	8,178	7,421
Sub-total: Operations and Maintenance	3	0	0	0	3	0	0	68	389	8,247	7,483
Total	3	0	0	0	3	0	0	76	389	8,254	7,490
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.129. Total Annual Emissions from Livestock Grazing Projects - Year 2024 - Alternative C

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	0	0	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	0	0	0	8	0	8	7
Sub-total: Construction	0	0	0	0	0	0	0	8	0	8	7
Commuting Vehicles - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	3	0	0	68	0	68	62
Enteric Fermentation and Manure	---	---	---	---	---	---	---		389	8,178	7,421
Sub-total: Operations and Maintenance	3	0	0	0	3	0	0	68	389	8,247	7,483
Total	3	0	0	0	3	0	0	76	389	8,254	7,490
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.130. Total Annual Emissions from Livestock Grazing Projects - Year 2015 - Alternative D

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	0	0	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	0	0	0	8	0	8	7
Sub-total: Construction	0	0	0	0	0	0	0	8	0	8	7
Commuting Vehicles - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	3	0	0	71	0	71	64
Enteric Fermentation and Manure	---	---	---	---	---	---	---		389	8,178	7,421
Sub-total: Operations and Maintenance	3	0	0	0	3	0	0	71	389	8,249	7,486
Total	3	0	0	0	3	0	0	78	389	8,257	7,493
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.131. Total Annual Emissions from Livestock Grazing Projects - Year 2024 - Alternative D

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	0	0	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	0	0	0	8	0	8	7
Sub-total: Construction	0	0	0	0	0	0	0	8	0	8	7
Commuting Vehicles - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	3	0	0	71	0	71	64
Enteric Fermentation and Manure	---	---	---	---	---	---	---		389	8,178	7,421
Sub-total: Operations and Maintenance	3	0	0	0	3	0	0	71	389	8,249	7,486
Total	3	0	0	0	3	0	0	78	389	8,257	7,493
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Appendix N. Buffalo Air Resource Management Plan

N.1. Introduction

N.1.1. Purpose

1. The purpose of this Air Resource Management Plan (RMP)is to further clarify air quality goals, objectives, and management actions set forth in Table 2.7, "1000 PHYSICAL RESOURCES (PR) – AIR QUALITY (AQ)" (p. 127) of the Proposed RMP and Final Environmental Impact Statement (EIS). This Air RMP describes air resources management and outlines specific requirements for proponents of projects that have the potential to generate air emissions and impact air resources within the planning area.

2. This Air RMP may be modified as necessary to comply with applicable laws, regulations, and policies and to address new information and changing circumstances.

N.1.2. Authority for Air Resource Management

1. **Federal Land Policy and Management Act of 1976**. The Federal Land Policy and Management Act (FLPMA) provides the Bureau of Land Management's (BLM) basic operating authority. It establishes a unified, comprehensive, and systematic approach to managing and preserving public lands in a way that protects "the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values." The BLM Air Resource Management Program, part of the BLM Soil, Water, and Air Program, coordinates and supports the BLM's efforts to manage air resources within its "multiple use" and "sustained yield" mission, as provided by FLPMA. FLPMA directs that in developing and revising its RMPs, the BLM shall provide for compliance with applicable air pollution control laws, including state and federal pollution standards or implementation plans.

2. **Clean Air Act of 1970**. The Clean Air Act (CAA) is the comprehensive federal law that provides for regulation of air emissions from stationary and mobile sources, national ambient air quality standards (NAAQS) to protect public health and public welfare, and protection of visibility in relatively pristine areas such as Class I national parks and wilderness areas. Class I is a CAA designation that affords certain areas the strictest air quality protection. Areas include some wilderness areas, national parks, and Native American reservations. See the *Planning Process* section, in Chapter 1 paragraph 5, for additional information. The CAA prescribes the measures that the United States (U.S.) Environmental Protection Agency (EPA) and other federal agencies and state, local, and tribal governments must take in order to regulate air pollution and achieve air quality that meets the NAAQS. In its RMPs and implementing authorizations, the BLM provides for compliance with the CAA and other pollution control laws. The CAA also requires that federal land managers responsible for lands within Class I areas protect the air quality related values of those areas.

   The Wyoming Department of Environmental Quality (DEQ) Air Quality Division (AQD) has been delegated authority by the EPA to implement federal programs of the CAA. The

Wyoming DEQ AQD is responsible for managing air quality through the Wyoming Air Quality Standards and Regulations and the Wyoming State Implementation Plan.

3. **Wilderness Act of 1964**. The Wilderness Act is the general legal authority for Congress to designate and for agencies to manage wilderness. Today, wilderness is designated for a variety of benefits, including clean air. The uses of wilderness include protection of air and watersheds; maintenance of soil and water quality, ecological stability, plant and animal gene pools, protection of archaeological and historical sites, habitat for wildlife; and livestock grazing. Wilderness provides opportunities for outdoor recreation and also provides for the exercise of valid existing rights such as water rights, mining claims, mineral leases, and rights-of-way. The majority of BLM Wilderness Areas allow some degradation of air quality associated with moderate industrial and population growth. The CAA allows States to require that Wilderness Areas meet a more stringent air quality standard using normal state processes.

   Minerals in wilderness are withdrawn from all forms of appropriation under the mining laws and from disposition under mineral leasing laws. Prior existing claims or leases with valid existing rights may be developed, though mineral development within wilderness is rare. The BLM as a Federal Land Manager analyzes potential impacts to designated Class II wilderness areas, national parks and monuments. Essentially, all areas that are not designated as Class I are designated as Class II. Moderate incremental increases in pollutant concentrations are allowed, although the concentrations are not allowed to reach the concentrations set by Wyoming and federal standards (Wyoming Ambient Air Quality Standards [WAAQS] and NAAQS). See the *Background* section, paragraph 5 for additional information.

4. **National Environmental Policy Act**. The National Environmental Policy Act (NEPA) establishes a public, interdisciplinary framework for federal decision-making and ensures that the BLM and other federal agencies take environmental factors into account when considering federal actions. The BLM uses the NEPA process to analyze potential impacts of its proposed actions on air and other resources and to consider appropriate measures to mitigate adverse impacts.

5. **Air Quality Memorandum of Understanding**. In June 2011, the U.S. Department of Agriculture, U.S. Department of the Interior (DOI), and the EPA signed the Memorandum of Understanding (MOU) Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions Through the NEPA Process. This MOU outlines an approach to the analysis of impacts to air quality and air quality related values, such as visibility in Class I and sensitive Class II areas, in connection with oil and gas development on federal lands, and identifies a path to protect air quality while allowing for oil and gas development on federally managed lands.

N.1.3. Background

1. Preparation of the Analysis of the Management Situation in 2009 disclosed that extensive energy development within the planning area, especially coal and fluid minerals, leads to dust, emissions, and other air quality impacts.

2. Monitoring air quality and establishing background concentrations can help to characterize changes over time. Table N.1, "National and State Primary Air Quality Standards for Criteria Pollutants and Representative Concentrations for the Planning Area" (p. 2481) displays the applicable primary NAAQS and WAAQS and representative

maximum pollutant concentrations for the planning area, based on monitoring data. Figure N.1, "Representative Maximum Pollutant Concentrations in the Planning Area as Percentage of NAAQS" (p. 2482) displays the representative maximum pollutant concentrations values from Table N.1, "National and State Primary Air Quality Standards for Criteria Pollutants and Representative Concentrations for the Planning Area" (p. 2481) as percentages of the NAAQS. These representative concentrations indicate the status of air quality conditions within the planning area relative to the standards. These data indicate that ozone concentrations are at least 75 percent of the NAAQS; therefore, ozone is the primary pollutant of concern in the planning area.

Existing visibility from Interagency Monitoring of Protected Visual Environments (IMPROVE) stations in the planning area are shown in the *Air Quality* section of Chapter 3 for the Thunder Basin site (Figure 3.14, "Annual Visibility (SVR) for the Thunder Basin IMPROVE Site" (p. 310)) and the Cloud Peak site (Figure 3.15, "Annual Visibility (SVR) for the Cloud Peak IMPROVE Site" (p. 311)). Visibility data from the Badlands IMPROVE site outside the planning area are also included (Figure 3.18, "Annual Visibility (SVR) for the Badlands National Park IMPROVE Site" (p. 314)). Data from these sites indicate good visibility in the planning area.

Table N.1. National and State Primary Air Quality Standards for Criteria Pollutants and Representative Concentrations for the Planning Area

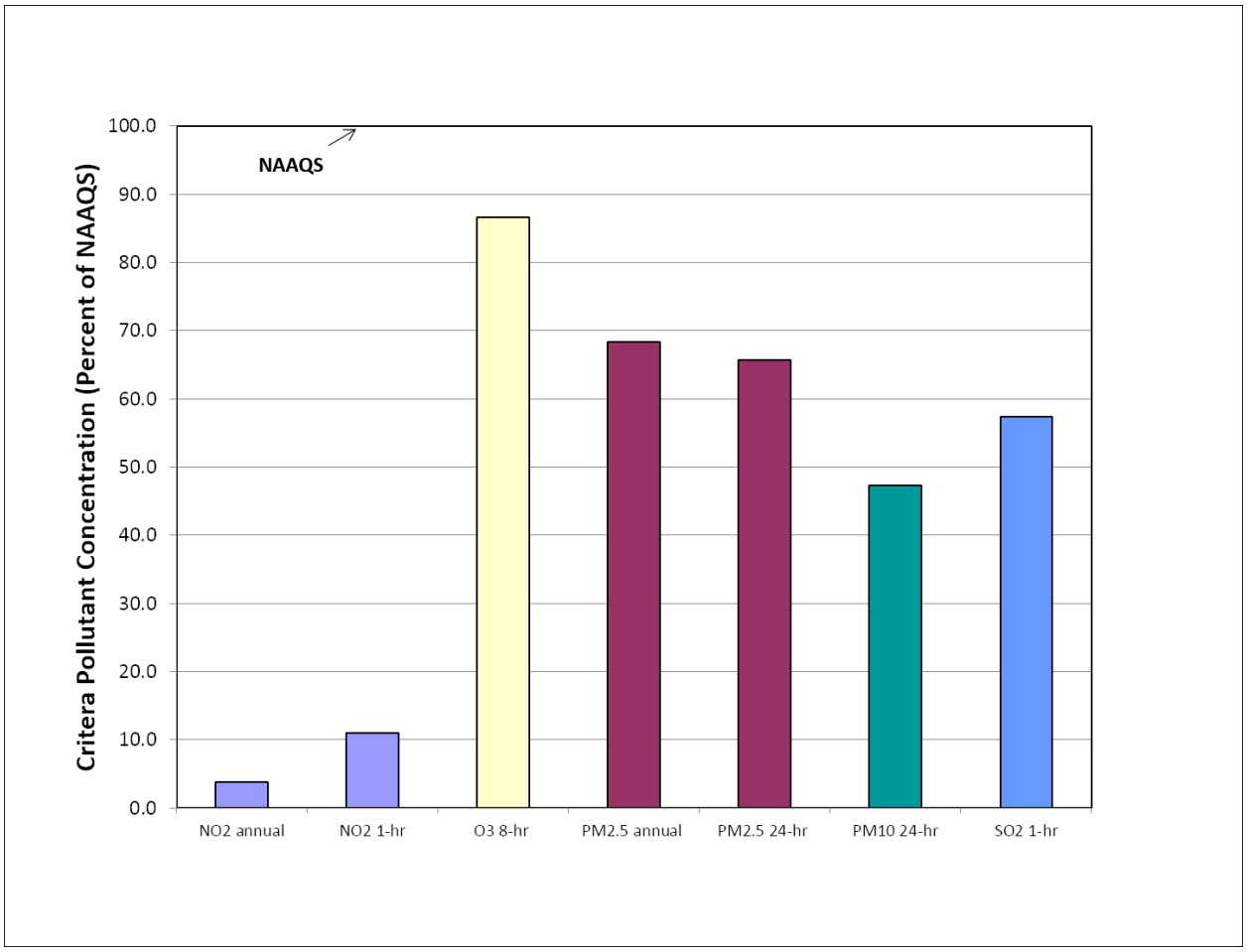
Pollutant	Averaging Time	NAAQS			WAAQS			Representative Concentrations		
		(ppm)	(ppb)	(µg/m^3)	(ppm)	(ppb)	(µg/m^3)	(ppm)	(ppb)	(µg/m^3)
Carbon Monoxide	1 hour [1]	35	35,000	40,000	35	35,000	40,000	0.8	800	914
	8 hour [1]	9	9,000	10,000	9	9,000	10,000	0.3	300	333
Nitrogen Dioxide	1 hour [2]	0.10	100	188	0.10	100	188	0.011	11	21
	Annual [3] (Arithmetic Mean)	0.053	53	100	0.053	53	100	0.002	2.0	4
Ozone	8 hour[4]	0.075	75	147	0.075	75	147	0.065	65	127
PM_{10}	24 hour [5]	N/A	N/A	150	N/A	N/A	150	N/A	N/A	96
$PM_{2.5}$	24 hour [6]	N/A	N/A	35	N/A	N/A	35	N/A	N/A	23
	Annual [7]	N/A	N/A	12	N/A	N/A	15	N/A	N/A	8.2

Pollutant	Averaging Time	NAAQS			WAAQS			Representative Concentrations		
		(ppm)	(ppb)	(µg/m^3)	(ppm)	(ppb)	(µg/m^3)	(ppm)	(ppb)	(µg/m^3)
Sulfur Dioxide	1 hour [8]	0.075	75	195	0.075	75	195	0.043	43	112

Source: EPA 2013a; Wyoming DEQ 2013c

[1] Not to be exceeded more than once per year. Data (2nd high) collected at Yellowstone National Park (AQS ID: 560391012) during 2012.
[2] To attain this standard, the 3-year average of the 98th percentile of 1-hour concentrations at each monitor within an area must not exceed 100 ppb. 3-year average of the 98th percentile 1-hour concentrations for Thunder Basin (AQS ID: 560050123) for 2010–2012.
[3] To attain this standard, the annual average concentration in the calendar year must be less than or equal to 53 ppb. Thunder Basin (AQS ID: 560050123) annual average concentration for 2012.
[4] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 75 ppb. Design value (2010–2012) for the Thunder Basin (AQS ID: 560050123) site.
[5] Not to be exceeded more than once per year on average over 3 years. 2010–2012 maximum PM_{10} concentration at Sheridan Police Station Monitoring Site (AQS ID: 56–033–0002).
[6] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor in an area must not exceed 35 µg/m3. 3-year (2010–2012) average of the 98th percentiles of 24-hour average $PM_{2.5}$ concentration at Sheridan Police Station Monitoring Site (AQS ID: 56–033–0002).
[7] To attain this standard, the 3-year average of the weighted annual mean concentrations from single or multiple community-oriented monitors must not exceed 12.0 µg/m^3. 3-year (2010–2012) average of the annual mean $PM_{2.5}$ concentration at Sheridan Police Station Monitoring Site (AQS ID: 56–033–0002).
[8] To attain this standard, the 3-year average of the 99th percentile of 1-hour concentrations at each monitor within an area must not exceed 100 ppb. 3-year (2010–2012) average of the 99th percentile 1-hour concentrations for Wyodak Site 4 (AQS ID: 56–005–0857).

µg/m^3 micrograms per cubic meter
EPA Environmental Protection Agency
N/A not applicable
NAAQS National Ambient Air Quality Standards
$PM_{2.5}$ particulate matter with an aerodynamic diameter equal to or less than 2.5 microns
PM_{10} particulate matter with an aerodynamic diameter equal to or less than 10 microns
ppm parts per million
ppb parts per billion
WAAQS Wyoming Ambient Air Quality Standards
WARMS Wyoming Air Resource Monitoring System



Source: EPA 2013a

Note: The representative maximum pollutant concentrations as a percentage of the NAAQS were calculated using the values in Table N.1, "National and State Primary Air Quality Standards for Criteria Pollutants and Representative Concentrations for the Planning Area" (p. 2481), which also provides the location and time period associated with monitoring data.

NAAQS National Ambient Air Quality Standards

Figure N.1. Representative Maximum Pollutant Concentrations in the Planning Area as Percentage of NAAQS

3. Consistent with the monitoring strategy of Management Action AQ-1002, the BLM Wyoming operates the Wyoming Air Resource Monitoring System (WARMS), a network of six air quality monitoring sites located throughout the state. Four of these sites are located in the planning area and two sites are located near the planning area – these sites are listed in Table N.2, "WARMS Network in and Near the Planning Area" (p. 2484) along with location, parameters monitored, and monitored particulate matter less than 2.5 microns ($PM_{2.5}$) concentrations. These sites also monitor hourly meteorological conditions including wind speed, wind direction, temperature, relative humidity, solar radiation, precipitation, and barometric pressure. The purpose of the WARMS network is to provide a general indicator of existing air quality and long term trends in air quality; it is not intended for use in determining NAAQS compliance. As shown in Table N.2, "WARMS Network in and Near the Planning

Area" (p. 2484), annual mean $PM_{2.5}$ values are below the NAAQS of 12 micrograms per cubic meter (µg/m^3) and the 98th percentile 24-hour average concentrations for any given year are below the NAAQS of 35 µg/m^3. The only WARMS monitor in Table N.2, "WARMS Network in and Near the Planning Area" (p. 2484) for which ozone data are available is the Basin monitor, which recorded a maximum 8-hour average of 0.061 parts per million (ppm) in 2011 and 0.065 ppm in 2012, both of which are below the NAAQS of 0.075 ppm.

4. Two WARMS sites outside the planning area include the Basin site located approximately 40 miles west of the planning area and the Newcastle site located approximately 43 miles east of the planning area (Table N.2, "WARMS Network in and Near the Planning Area" (p. 2484)). These sites were upgraded in 2012 to be fully compliant with, and part of, the Clean Air Status and Trends Network (CASTNET) system supported by the EPA (Sheridan and Buffalo sites are also part of the CASTNET system). CASTNET provides long-term monitoring of air quality in rural areas to determine trends in regional atmospheric nitrogen, sulfur, and ozone concentrations and dry deposition fluxes of sulfur and nitrogen pollutants in order to evaluate the effectiveness of national and regional air pollution control programs.

Table N.2. WARMS Network in and Near the Planning Area

Site	Approximate Location	Parameters Monitored			$PM_{2.5}$ Concentrations (ug/m^3)					
					2010		2011		2012	
		Speciated Aerosol (weekly)	$PM_{2.5}$ (1-hour)	Ozone (1-hour)	Annual Mean	24-hour 98th Percentile	Annual Mean	24-hour 98th Percentile	Annual Mean	24-hour 98th Percentile
In Planning Area										
Buffalo	30 miles SE of Buffalo	x	x		3.0	9	2.5	9	3.3	11
Fortification Creek	10 miles N of Gillette	x	x		-- [1]	--	--	--	--	--
Sheridan	In Sheridan	x	x	x[2]	1.5	9	1.5	11	3.0	16
South Coal	50 miles NNW of Gillette		x		0.8	6	0.8	10	1.8	14
Outside Planning Area										
Basin	40 miles W of Planning Area	x	x	x	--[3]	--	--	--	1.0	10

Site	Approximate Location	Parameters Monitored			$PM_{2.5}$ Concentrations (ug/m^3)					
					2010		2011		2012	
		Speciated Aerosol (weekly)	$PM_{2.5}$ (1-hour)	Ozone (1-hour)	Annual Mean	24-hour 98th Percentile	Annual Mean	24-hour 98th Percentile	Annual Mean	24-hour 98th Percentile
Newcastle	43 miles E of Planning Area	x	x	x[4]	0.3	4	0.5	4	4.0/0.8[5]	8/8[5]

Source: WARMS 2013

[1] Fortification Creek is scheduled for installation Spring 2013; thus historic data not available.
[2] Sheridan did not start ozone monitoring until January 2013; thus historic ozone data not available.
[3] Basin did not monitor for $PM_{2.5}$ until upgraded to CASTNET status in late 2012; thus historic data not available.
[4] Newcastle did not start ozone monitoring until late 2012; thus historic ozone data not available.
[5] In 2012, an E-BAM replaced an e-sampler; data are provided from both monitors.

CASTNET Clean Air Status and Trends Network
E East
N North
NNW North northwest
$PM_{2.5}$ particulate matter with an aerodynamic diameter equal to or less than 2.5 microns
$\mu g/m^3$ micrograms per cubic meter
SE Southeast
W West

5. The CAA Prevention of Significant Deterioration (PSD) program protects air quality in areas where the air is clean and the area is in attainment or unclassifiable with respect to NAAQS. The PSD program is a permitting program that, in Wyoming, is implemented by the Wyoming DEQ AQD. PSD is designed to protect clean air so it does not significantly deteriorate, while a margin for future industrial growth is maintained. Under the PSD program, each area in the United States is classified according to the following system:
   - **PSD Class I Areas** – Areas with pristine air quality, such as wilderness areas, national parks, and some Native American reservations, are accorded the strictest protection. Only very small incremental increases in pollutant concentrations are allowed in order to maintain the very clean air quality in these areas. Wilderness areas greater than 5,000 acres (and national parks greater than 6,000 acres) that had been established before August 7, 1977 were designated by the CAA as mandatory class I areas.
   - **PSD Class II Areas** – Essentially, all areas that are not designated as Class I are designated as Class II. Moderate incremental increases in pollutant concentrations are allowed, although the concentrations are not allowed to reach the concentrations set by Wyoming and federal standards (WAAQS and NAAQS). Some Class II areas are federally-managed Class II wilderness areas, which are afforded additional air quality protection under the Wilderness Act beyond that provided by CAA.
   - **PSD Class III Areas** – No areas have been designated yet as Class III. A larger incremental increase in pollutant concentrations would be allowed, up to the applicable WAAQS and NAAQS.

   Class I areas near the planning area include: the Northern Cheyenne Indian Reservation (25 miles north), the North Absaroka Wilderness Area (75 miles west), the Washakie Wilderness Area (96 miles west), Yellowstone National Park (97 miles west), Wind Cave National Park (80 miles east), and Badlands National Park (110 miles east). The Northern Cheyenne Indian

Reservation received EPA redesignation approval on August 5, 1977, to become a Class I area under the PSD program (40 Code of Federal Regulations 52.1382(c)(2)).

N.1.4. Characterization of Air Resources in the Environmental Impact Statement

1. Emissions Inventory for Land Use Planning

    a. An air emissions inventory was compiled for the planning area to determine the relative magnitude of total air pollutant emissions and to compare emissions between alternatives. This emissions inventory is summarized in Appendix M (p. 2239). Emissions were calculated using assumptions about the likelihood of potential future activities occurring under each alternative. As a result, the compiled air emissions inventory represents a comparison of emissions of air pollutants based on best available information for future development projections. The methods and assumptions used in compiling the emissions inventory are provided in Chapter 4, *Air Quality* section, as well as Appendix M (p. 2239) which lists emissions generating activities and includes additional details on the computational methods.

    b. The emissions inventory is valuable for contrasting the impact of land use allocations on air resources among alternatives and useful for identifying those activities that are likely to be major contributors of emissions.

    c. The air emissions inventory supports two major conclusions: (1) for the majority of the pollutants examined, emissions are estimated to increase compared to baseline levels for all alternatives except Alternative B, and (2) oil and gas development activities and mining (primarily coal) are the largest contributors to total emissions compared to other managed activities in the planning area.

2. Class I Areas

    a. There are no Class I areas within the planning area. The nearest Class I areas include the Northern Cheyenne Indian Reservation (25 miles north), the North Absaroka Wilderness Area (75 miles west), the Washakie Wilderness Area (96 miles west), Yellowstone National Park (97 miles west), Wind Cave National Park (80 miles east), and Badlands National Park (110 miles east). See Table 3.4, "Class I and Class II Areas in or near the Buffalo Planning Area" (p. 309) in Chapter 3 for a list of Class I and federally-managed Class II areas in or near the planning area.

    Though not located in Class I areas, there are two IMPROVE sites in the planning area: Cloud Peak (western region of the planning area) and Thunder Basin (eastern region of the planning area). A third IMPROVE site is located in the Northern Cheyenne Indian Reservation Class I area, approximately 45 miles from the northern boundary of the planning area. Visibility estimates for these locations, as well as the Badlands, are shown in Chapter 3.

N.2. Air Resource Management Plan

N.2.1. Coal Lease by Application

1. The Wyoming DEQ and DOI Office of Surface Mining Reclamation and Enforcement (OSM) have the permitting oversight and authority to mitigate air quality or land quality issues for a coal mining operation. The BLM does not stipulate any specific air quality or land quality permitting requirement for a coal lease, but requires lessees to comply with all applicable state and federal laws. A BLM EIS for a coal mining operation will analyze the potential effects to air quality, but any mitigation will be a requirement of the Wyoming DEQ through its permitting process.

2. The Wyoming DEQ AQD administers a permitting program to assist in managing the state's air resources. Under this program, anyone planning to construct, modify, or use a facility capable of emitting designated pollutants into the atmosphere must obtain an air quality permit to construct. Coal mines fall into this category.

3. A new coal mine, or a modification to an existing mine, must be permitted by Wyoming DEQ AQD, pursuant to the provisions of Wyoming Air Quality Standards and Regulations Chapter 6, Section 2. Under these provisions, a permittee must compile detailed emissions inventories and demonstrate compliance with all applicable aspects of Wyoming Air Quality Standards and Regulations, including compliance with WAAQS and NAAQS, before either a permit or amendment is granted.

4. A Best Available Control Technology (BACT) analysis is required to demonstrate the use of an appropriate level of emissions controls. Per Wyoming Air Quality Standards and Regulations Chapter 6, Section 2, BACT at large mining operations typically includes, but is not limited to: the paving of access roads; the treating of major haul roads with a suitable dust suppressant; the treatment of temporary haul roads; the use of silos, trough barns, or similar enclosed containers for the storage of large volumes of material awaiting load out and shipment; and the treatment of active work areas.

N.2.2. Mineral and Energy Development Authorizations

1. The BLM manages the location, density, and/or rate of development to protect air resources.

2. When reviewing a proposed project, the BLM will consider the magnitude of potential air emissions from the project, existing air quality conditions, proximity to Class I and sensitive Class II areas, and issues identified during project scoping to identify pollutants of concern and to determine the appropriate level of air analysis to be conducted for the project.

3. The BLM will require an emissions inventory, as set forth in the MOU, for proposed oil and gas development projects that are analyzed through an EIS. The BLM may require an emissions inventory for proposed oil and gas or mineral development projects that are analyzed through an Environmental Assessment, and may require project specific air quality modeling (see Management Action AQ-1006) depending on project characteristics, proximity to a federally mandated Class I area, sensitive Class II area, or population center, location within a non-attainment or maintenance area, meteorologic or geographic conditions, existing air quality conditions, magnitude of existing development in the area, or issues identified

during project scoping. The emissions inventory will quantify emissions of regulated air pollutants from all sources related to the proposed project, and emissions impacting Class I areas, including fugitive emissions and greenhouse gas emissions. Emissions will be estimated for each year for the life of the project. The BLM will use this estimated emissions inventory to identify pollutants of concern and to determine the appropriate level of air analysis to be conducted for the proposed project. This information will inform monitoring (see Section N.2.3 Monitoring), modeling (see Section N.2.4 Modeling) and mitigation (see Section N.2.5 Mitigation).

4. The BLM has the responsibility to implement the decisions of the RMP in a manner that protects air quality. The BLM also must recognize valid and existing leasing rights. At the project approval stage, the BLM can require specific actions and measures to protect air quality based on expected impacts (Management Actions AQ-1003 and AQ-1005). The BLM may require additional mitigation measures within its authority for emissions sources not otherwise regulated by Wyoming DEQ (see Section N.2.5 paragraph 2).

5. The proponent of a mineral and/or energy development project will be required to provide a detailed description of operator committed measures to reduce project related air pollutant emissions including greenhouse gases and fugitive dust. Project proponents for oil and gas development projects should refer to Table N.3, "Sample Emission Reduction Strategies for Oil and Gas Development Projects" (p. 2490) as a reference for potential mitigation technologies and strategies. The list is not intended to preclude the use of other effective air pollution control technologies that may be proposed. Details of the mitigation measure would be submitted by the applicant and enforced as a condition of the BLM-issued authorization.

6. The BLM, in determining the suitability of the operator committed measures required in Section 2.2 paragraph 5, will take into account proximity to a federally mandated Class I area, sensitive Class II area, or population centers, location within a non-attainment or maintenance area, meteorologic or geographic conditions, existing air quality conditions, magnitude of existing development in the area, or issues identified during project scoping.

N.2.3. Monitoring

1. As part of a comprehensive Air RMP for the planning area, the BLM will continue to work cooperatively with federal and state agencies responsible for managing air resources to determine, characterize, and track air resource conditions (Management Action AQ-1002 and AQ-1004). BLM will cooperate with efforts of the Wyoming DEQ to evaluate monitored exceedances. Wyoming DEQ has authority and primacy for regulating and monitoring air quality within the state, including determining causes of monitored exceedances of NAAQS and WAAQS.

2. The BLM will support and participate in regional monitoring efforts to meet Management Action AQ-1002.

N.2.4. Modeling

1. Air dispersion and photochemical grid models are useful tools for predicting project specific impacts to air quality, predicting the potential effectiveness of control measures and strategies, and for predicting trends in regional concentrations of some air pollutants.

2. BLM may require project proponents to conduct air quality modeling based on the absence of sufficient data to ensure compliance with laws and regulations or to determine the effectiveness of mitigation options. The BLM will decide whether far-field modeling is required to support the NEPA analysis for an oil and gas project in accordance with the MOU, based on existing air quality conditions; magnitude of potential air emissions from the project or activity; magnitude of existing emission sources in the area; proximity to a federally mandated Class I area, sensitive Class II area, an area expected to exceed a NAAQS or PSD increment or population center; location within a non-attainment or maintenance area; meteorologic or geographic conditions; project duration; or issues identified during project scoping (Management Action AQ-1006). BLM will require project-specific near field modeling or apply a similar analysis completed for a nearby project, if, after reviewing a proposed project's emission inventory, BLM determines that the project may cause significant near field impacts.

3. BLM will leverage data from current and future modeling efforts being conducted in the region (such as Converse County, Moneta Divide, and other proposed projects that will analyze cumulative impacts with a photochemical grid model) to assess the air quality and air quality related values within the Buffalo Field Office. When results from these types of modeling analyses are used to evaluate impacts within the planning area, BLM will ensure that direct emissions from BLM's management actions within the Buffalo planning area are included in the particular analysis. Pending completion of these modeling analyses, the BLM, in cooperation with an interagency review team, will evaluate impacts from proposed federal actions within the planning area and identify and evaluate, in cooperation with Wyoming DEQ to whom EPA has delegated authority for regulating air quality in Wyoming, the need for additional emission mitigation measures or the need for a more refined modeling analysis.

4. Consistent with Management Action AQ-1004, the BLM will support and participate in regional modeling efforts through multi-state and/or multi-agency organizations such as Western Governors' Association – Western Regional Air Partnership, and the Federal Leadership Forum. If results from an interagency, regional modeling study are used to evaluate impacts within the planning area, the BLM will ensure that direct emissions from BLM's management actions within the region are included in the study.

5. The use of modeling to identify appropriate protection measures is more effective at the project approval stage rather than the leasing stage because the proposed action has been defined in terms of temporal and spatial characteristics as well as development processes and procedures. This better defined information allows more precise identification of impacts to air quality and appropriate level of mitigation.

N.2.5. Mitigation

1. Many of the activities that BLM authorizes, permits, or allows generate air pollutant emissions that have the potential to impact air quality. The primary mechanisms to reduce air quality impacts are to reduce emissions through strategies such as controlling the rate of development, or by implementation of mitigations such as use of emissions control technology.

2. The proponent of a project will be required to reduce air pollutant emissions by complying with all applicable state and federal regulations (including application of BACT) and may be required to apply additional mitigation and other control technologies or strategies.

3. BLM will ensure implementation of additional air emission control measures and strategies within its regulatory authority and in consultation with federal and state agencies responsible for managing air resources, if:

   a. proposed or committed measures are insufficient to achieve air quality goal PR:1 and objectives PR:1.1, PR:1.2, PR:1.3, and PR:1.4 and Management Action AQ-1003; or

   b. an air quality impact analysis shows that future impacts likely will be above acceptable levels; or

   c. a BLM-authorized source caused or contributed to a monitored exceedance of the NAAQS as determined by Wyoming DEQ, in consultation with BLM.

   Mitigation may include reduction in the number of locations, density, and/or rate of development, or other measures. Example mitigation strategies for oil and gas development activities are presented in Table N.3, "Sample Emission Reduction Strategies for Oil and Gas Development Projects" (p. 2490).

Table N.3. Sample Emission Reduction Strategies for Oil and Gas Development Projects

Emission Reduction Measure	Advantages and Disadvantages
Control Strategies for Drilling and Compression	
Directional or Horizontal Drilling	May reduce construction related emissions (dust and vehicle and construction equipment emissions). Decreases surface disturbance and vegetation impacts (dust and carbon dioxide and nitrogen flux). Reduces habitat fragmentation. Applicability depends on geologic strata. May result in higher air impacts in one area with longer sustained drilling times.
Improved engine technology (Tier 2 or better) for diesel drill rig engines.	Can reduce oxides of nitrogen (NO_x), particulate matter (PM), carbon monoxide (CO), and volatile organic compounds (VOC) emissions. Use depends on availability of technology from engine manufacturers.
Selective Catalytic Reduction (SCR) for drill rig engines and/or compressors.	NO_x emissions reduction, potential decreased formation of visibility impairing compounds and ozone. NO_x control efficiency of 95% achieved on drill rig engines. NO_x emission rate of 0.1 (grams per horsepower per hour (g/hp-hour) achieved for compressors. Potential ammonia (NH_3) emissions and formation of visibility impairing ammonium sulfate. Regeneration/disposal of catalyst can produce hazardous waste. Not applicable to 2-stroke engines.
Non-selective catalytic reduction (NSCR) for drill rig engines and/or compressors.	NO_x emissions reduction, potential decreased formation of visibility impairing compounds and ozone. NO_x control efficiency of 80-90% achieved for drill rig engines. NO_x emission rate of 0.7 g/hp-hour achieved for compressor engines greater than 100 hp. Regeneration/disposal of catalysts can produce hazardous waste. Not applicable to lean burn or 2-stroke engines.

Emission Reduction Measure	Advantages and Disadvantages
Natural gas fired drill rig engines and/or compressors.	NO_x emissions reduction, potential decreased formation of visibility impairing compounds and ozone. Requires onsite processing of field gas.
Improved engine technology (Tier 2 or better) for all mobile and non-road diesel engines.	Reduced NO_x, PM, CO, and VOC emissions. Dependent on availability of technology from engine manufacturers.
Green (a.k.a. closed loop or flareless) completions and green workovers.	Reduction in VOC and methane emissions. Reduces or eliminates flaring and venting and associated emissions. Reduces or eliminates open pits and associated evaporative emissions. Increased recovery of gas to pipeline rather than atmosphere. Temporary increase in truck traffic and associated emissions. Need adequate pressure and flow. Need onsite infrastructure (tanks/dehydrator). Sales line must be available. Green completion permits required by Wyoming best available control technology (BACT) in some areas.
Minimize/eliminate venting and/or use closed loop process where possible during "blow downs." Utilize plunger lift systems with smart automation.	Same as above. Best Management Practices required by Wyoming BACT.
Reclaim/remediate existing open pits, no new open pits.	Reduces VOC and greenhouse gas (GHG) emissions. Reduces potential for soil and water contamination. Reduces odors. Requires tank and/or pipeline infrastructure. May increase truck traffic and associated emissions.
Electrification of wellhead compression/pumping	Reduces local emissions of fossil fuel combustion and transfers to more easily controlled source. Depends on availability of power and transmission lines. Displaces emissions to Electric Generating Unit (EGU).
Seasonally reducing or ceasing drilling during specified periods, or using only lower-emitting drill and completion rig engines during specified time periods. Restrict drilling and/or blowdown activity based on meteorological conditions.	Reduces emissions during periods when emissions are more likely to have impact in local area or at sensitive receptors.
Control Strategies Utilizing Centralized Systems	
Centralization (or consolidation) of gas processing facilities (separation, dehydration, sweetening, etc.).	Reduces vehicle miles traveled (truck traffic) and associated emissions. Reduced VOC and GHG emissions from individual dehy/separator units. Requires pipeline infrastructure. Temporary increase in construction associated emissions. Higher potential for pipe leaks/groundwater impacts.
Liquids gathering systems (for condensate and produced water).	Reduces vehicle miles traveled and associated emissions. Reduced VOC and GHG emissions from tanks, truck loading/unloading, and multiple production facilities. Requires pipeline infrastructure. Temporary increase in construction associated emissions. Higher potential for pipe leaks/groundwater impacts.
Water and/or fracturing liquids delivery system, including centralized (“hub and spoke”) hydraulic fracturing.	Reduced long term truck traffic and associated emissions. Requires pipeline infrastructure. Not feasible for some terrain. Temporary increase in construction associated emissions. Higher potential for pipe leaks/groundwater impacts.

Emission Reduction Measure	Advantages and Disadvantages
Control Strategies for Tanks, Separators, and Dehydrators	
Capture and control of flashing emissions from all storage tanks and separation vessels with vapor recovery and/or thermal combustion units.	Reduces VOC and GHG emissions. 98% VOC control if greater than or equal to 10 tons per year required statewide by Wyoming BACT. Pressure build up on older tanks can lead to uncontrolled rupture.
Capture and control of produced water tank emissions.	Reduces VOC and GHG emissions. 98% VOC control and no open top tanks required by Wyoming Department of Environmental Quality in some areas.
Capture and control of dehydration equipment emissions with condensers, vapor recovery, and/or thermal combustion.	Reduces VOC, HAP, and GHG emissions. Still vent condensers required and 98% VOC control if greater than or equal to 8 tons per year required statewide and in concentrated development area by Wyoming BACT. All dehy emissions controlled at 98% in Jonah Pinedale Anticline Development (no 8 tons per year threshold).
Control Strategies for Misc. Fugitive VOC Emissions	
Install and maintain low VOC emitting seals, valves, hatches on production equipment.	Reduces VOC and GHG emissions.
Initiate an equipment leak detection and repair program (including use of Forward Looking Infrared Radiometer cameras, grab samples, organic vapor detection devices, visual inspection, etc.), such as an enhanced direct inspection and maintenance program.	Reduction in VOC and GHG emissions.
Install or convert gas operated pneumatic devices and pumps to electric, solar, or instrument (or compressed) air driven devices/controllers.	Reduces VOC and GHG emissions. Required statewide by Wyoming BACT if no thermal combustion used. Electric or compressed air driven operations can displace or increase combustion emissions. Increase in noise due to compressor.
Use "low" or "no bleed" gas operated pneumatic devices/controllers.	Reduces VOC and GHG emissions. Closed loop required statewide by Wyoming BACT.
Use closed loop system or thermal combustion for gas operated pneumatic pump emissions.	Reduces VOC and GHG emissions. Required statewide by Wyoming BACT (98% VOC control or closed loop).
Install vapor recovery on truck loading/unloading operations at tanks.	Reduces emissions of VOC and GHG emissions. Wyoming BACT analysis required if VOC greater than or equal to 8 tons per year or HAP greater than or equal to 5 tons per year. Pressure build up on older tanks can lead to uncontrolled rupture.
Control Strategies for Fugitive Dust and Vehicle Emissions	
Unpaved surface treatments including watering, chemical suppressants, and gravel.	20% - 80% control of fugitive dust (particulates) from vehicle traffic. Potential impacts to water and vegetation from runoff of suppressants.
Use remote telemetry and automation of wellhead equipment.	Reduces vehicle traffic and associated emissions.
Speed limit control and enforcement on unpaved roads, and design of roads to reduce speed.	Reduction of fugitive dust emissions.
Reduce commuter vehicle trips through car pools, commuter vans or buses, innovative work schedules, or work camps.	Reduced combustion emissions, reduced fugitive dust emissions, reduced ozone formation, reduced impacts to visibility.
Miscellaneous Control Strategies	

Emission Reduction Measure	Advantages and Disadvantages
Use of ultra-low sulfur diesel in engines, compressors, construction equipment, etc.	Reduces emissions of particulates and sulfates. Fuel not readily available in some areas.
Reduce vehicle idling.	Reduced combustion emissions, reduced ozone formation, reduced impacts to visibility, reduced fuel consumption. May not be feasible in remote locations where leaving vehicle in operation is a safety precaution.
Reduced density or rate of development.	Peak emissions of all pollutants reduced. May not be economically viable or feasible if multiple mineral interests. Emissions generated at a lower rate but for a longer period. Limited operating period, duration of impacts is longer.
Restrict construction activity based on meteorological conditions.	Reduces emissions during periods when emissions are more likely to have impact in local area or at sensitive receptors.
BACT Best Available Control Technology CO Carbon monoxide EGU Electric Generating Unit G/HP-hour Grams per Horsepower per Hour GHG Greenhouse Gas NH_3 Ammonia NO_X Nitrogen oxide NSCR Non-Selective Catalytic Reduction PM Particulate Matter SCR Selective Catalytic Reduction VOC Volatile Organic Compound	

N.2.6. Contingency Plans

1. If observed effects (e.g., monitored exceedances of the NAAQS) or modeled impacts show state or federal regulatory standards or applicable thresholds for air quality related values may be exceeded, BLM may require mitigation measures within BLM's authority to ensure conformance with RMP air quality goals and objectives. For example, the BLM may manage the location, density and rate of development, or require smaller-emission projects to demonstrate compliance with standards or applicable thresholds.

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Appendix O. Reclamation Policy for the Buffalo Field Office

Introduction

Reclamation is required for any surface-disturbing activity occurring as part of a federal action. A reclamation plan appropriate in detail and complexity and tailored to a specific surface-disturbing activity will be required for each activity. The level of detail for the reclamation plan shall reflect the complexity of the project, the environmental concerns, the reclamation potential for the site, and the reclamation strategy. These plans shall also incorporate any program or regulatory specific requirements for reclamation. The reclamation plan shall address initial disturbance and stabilization, short-term and long term reclamation goals to achieve final restoration. Reclamation plans must set reasonable, achievable, and measurable reclamation goals which are consistent with the established land use plans. This appendix details the reclamation objectives and standards necessary to achieve a timely and proper recovery according to management objects of the disturbed site.

Wyoming Bureau of Land Management (BLM) Reclamation Policy, Instruction Memorandum (IM), No. WY-2012-032 (BLM 2012i) states "A reclamation plan shall be developed for all surface disturbing activities and will become part of the proposed action in the National Environmental Policy Act document." This policy was developed by the Buffalo BLM (hereafter referred to as BLM) to ensure the following: uniform application of exploration, development, and reclamation standards; ensure prompt reclamation of lands to productive uses consistent with land management policies; shall integrate appropriate disciplines in the natural sciences, engineering and design arts in establishing criteria for reclaiming disturbed land, reviewing reclamation plans, and monitoring reclamation activities; shall assist in the identification of information needs that can be provided by research and encourage research projects to provide such information; utilize the best available information in developing and reviewing reclamation plans.

In preparing and reviewing reclamation plans, the BLM and the project proponent will adhere to Wyoming Reclamation Policy for all surface disturbing activities. In addition, *BLM's Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development "The Gold Book"* (BLM 2006f) specially pertain to oil and gas related surface disturbing activities.

Background

The reclamation plan will provide a framework to develop project level and site-specific reclamation actions and guide land management efforts toward a planned future condition for any surface disturbance. Sensitive areas may require site-specific reclamation measures; Alternatives considered should include: avoidance and/or unconventional site specific reclamation requirements. Early coordination between the BLM and project proponent is necessary to produce a comprehensive plan. The approved reclamation plan will serve as a binding agreement between the project proponent and the BLM for the expected reclamation condition of the disturbed lands and must be periodically reviewed and modified as necessary. The proponent will develop the reclamation plan, with appropriate BLM involvement in preplanning, data inventory, and approval. This is essential to develop the optimum reclamation proposal. Changes to an approved reclamation plan are allowed only with concurrence of the BLM authorized officer.

Site selection for the proposed action prior to disturbance activities is key to reclamation success and is an integral part of the operational plan. Every attempt should be made to develop and implement new ideas and technologies that limit or reduce the amount of land surface disturbance and its impacts. Such planning efforts are necessary for successful reclamation.

Some items to be included in reclamation planning should consider, in part, vegetative succession patterns and processes appropriate for restoration of the project area, salvaging and reusing all available topsoil, site stabilization/erosion control, controlling invasive non-native plants and noxious weeds, and maintenance and health of soils. Monitoring and reporting is the best way to track success and implement adaptive management strategies.

Goals and Objectives

The reclamation plan is designed to meet the following objectives for reclamation of areas disturbed by the Project. On split estate the BLM will consider the views of private surface owner (Onshore Order No.1.XII.B.4).

Initial Construction and Stabilization

- Immediately stabilizing the disturbed areas.
- Controlling and minimizing surface runoff, erosion, and sedimentation.

Interim Reclamation

The objective of interim reclamation is to restore desirable vegetative cover and a portion of the landform sufficient to maintain healthy, biologically active topsoil; control erosion; minimize habitat loss, reduce visual impact, and reduce forage loss during the life of the disturbance. Emphasis should be to reduce the footprint of the disturbed area to that which is necessary for not essential for operational function while minimizing the area to be redisturbed at the time of final reclamation. Items to be addressed under interim reclamation include, in part:

- Stabilizing the disturbed soil surface, controlling runoff and erosion, and establishing new vegetation.
- Ensuring adequate surface roughness to reduce runoff and to capture rainfall and snow.
- Controlling and minimizing surface runoff, erosion, and sedimentation using diversion and water treatment structures.
- Restoring primary productivity of the site and establishing vegetation that will provide for natural plant and community succession.
- Establishing a vigorous stand of desirable plant species that will limit or preclude the invasion of undesirable species, including noxious/invasive species.
- Reseeding the disturbed areas with native plant species beneficial to wildlife and livestock.

Final Reclamation and Restoration

The long-term objective of final reclamation is to return the land to an approximate condition and/or function of that which existed prior to disturbance. This includes restoration of the landform and natural vegetative community, soil health, hydrologic systems, visual resources, and wildlife habitats. To ensure that the long-term objective will be reached through human and natural processes, action will be taken to ensure requirements are met for site stability, visual quality, hydrological functioning and vegetative productivity. In addition to achieving the interim reclamation objectives, items to be addressed under final reclamation include, in part:

- Re-contouring to approximate pre-construction grade;

- Enhancing aesthetic values; in the long-term, reclaimed landscapes would have characteristics that approximate the visual quality of adjacent areas, including location, scale, shape, color, and orientation of undisturbed major landscape features.

Reclamation Plan

Reclamation plans provide detailed guidelines for the reclamation process and fulfill federal, state, county, and other local agencies requirements. They can be used by regulatory agencies to ensure that the reclamation measures are implemented, are appropriate for the site. Reclamation plans will be used by the project proponent throughout the operational period of the project and subsequent to cessation of surface-disturbing activities. In turn, responsible agencies, including the BLM, will use the reclamation plan as a basis to review and evaluate the success of the reclamation program. Reclamation plans should provide methods to assist in monitoring and compliance evaluations.

A reclamation plan is a planning document which will provide comprehensive as well as detailed reclamation procedures, methods and actions to successfully meet the final objective. The following items are emphasized to achieve reclamation goals:

1. Properly locate site prior to disturbance;
2. Minimize disturbance of the existing environment;
3. Conduct preliminary baseline surveys to allow for proper planning and timely implementation of planned activities. Such surveys may include existing plant communities, composition, structure, (e.g., Ecological Site Description [ESD]) and successional pathway are appropriate for restoration of the project area;
4. Establish desired native vegetation that fits in with the successional stage of the identified (ESD) or an alternate vegetative regime in consultation with the BLM;
5. Identify and map areas of Limited Reclamation Potential;
6. Identify and map soils with Poor Reclamation Suitability, Severe Erosion Potential, Slopes in Excess of 25%;
7. Identify and map hydrologic features;
8. Additional detailed information would include:
    a. ESDs, referenced plant communities, and soil map unit(s);
    b. Methods planned to conserve suitable topsoil for use in reclamation;
    c. Identify topsoil depth, and proposed location of stockpiled subsoil and topsoil;
    d. Identify limiting soil factors through soil analysis;
    e. Predisturbance photo or current photo documenting the condition of the site;
    f. A statement of acreage of initial disturbance, acreage of disturbance for interim reclamation, and acreage that will be re-disturbed preparing the surface for final reclamation.

The level of detail for the reclamation plan shall reflect: the complexity of the project, the environmental concerns, and the reclamation potential for the site. The reclamation plan is considered complete when all the reclamation requirements in Wyoming Reclamation Policy IM 2010-022 have been addressed, the techniques to meet the reclamation requirements are described in detail, and the BLM concurs with the reclamation plan during the project planning process, as well as subsequent revisions.

The RMP indicates and identifies soils in the planning area that are severely erosive or otherwise sensitive to physical disturbance (see the Soils section in Chapter 3 and Maps 3–6). Table O.1,

"Sensitive Soil Areas on BLM-administered Surface in the Planning Area" (p. 2498), (p. 3) shows the approximate acres and sensitive soils in the planning area. Surface disturbance in areas listed in Table O.1, "Sensitive Soil Areas on BLM-administered Surface in the Planning Area" (p. 2498), (p. 3) will be strictly controlled or, if necessary, prohibited.

Table O.1. Sensitive Soil Areas on BLM-administered Surface in the Planning Area

Relative Erosion Potential	Acres	Percent of Planning Area
Limited Reclamation Potential	218,928	28
Severe Erosion Potential	215,496	28
Slopes in Excess of 25%	170,590	22

Source: NRCS 2010a
*For analysis purposes, sensitive soils and sites, NRCS SSURGO data were evaluated and displayed with GIS tools. The areas identified as sensitive could be substantially less due to the generalization in the applicable GIS shape file polygons. Soil mapping units may have cumulative sensitive features.

GIS Geographic Information System
NRCS Natural Resources Conservation Service
SSURGO Soil Survey Geographic Database

Where surface disturbance is proposed in areas identified in Table, "Sensitive Soils on BLM-administered Surface in the Planning Area" (p. 3) or in areas where there are other resource concerns such as habitat fragmentation, a more detailed reclamation plan may be required. These more detailed reclamation plans must be appropriate for the site and may include any or all of the following, in addition to those listed above:

1. Disturbance specific stabilization efforts and reclamation plans described by surveyed station number, latitude/longitude or by erosive feature;
2. Engineered diagrams layered on topographical maps showing cut/fills and limits of disturbance;
3. Additional information may be required at the discretion of the authorized officer; for example but not limited to a geotechnical analysis, and/or reclamation bonding depending upon specific site characteristics.

A qualified soil specialist will make all topsoil salvage recommendations prior to land disturbance. These recommendations will be based on review of soil mapping units of specific well sites and soil sampling within common soil mapping units and vegetation communities, as needed.

Wyoming Department of Environmental Quality's Guideline 1 Topsoil and Overburden will be used as a reference to rank soils as good, fair, or poor for topsoil salvage. In no case will soils rated poor for topsoil salvage be used unless properly amended, as determined by a qualified soil specialist.

Re-vegetation:
Every effort should be made to use state of the art knowledge for successful reclamation of disturbed sites some applicable references may include: BLM Manual 5714 for seeding methods Refer to BLM Handbook 1740-2 for native seed and plant materials selection.

Success Criteria

The BLM will evaluate reclamation success using the requirements set forth in the BLM Reclamation Policy IM WY-2012-032 (BLM 2012i) with emphasis on soil stabilization and revegetation. Soil stabilization or erosion control is generally sufficient when water naturally

infiltrates into the soil and no evidence of accelerated erosion on or adjacent to the reclaimed site. Reclamation can generally be judged successful when a self-sustaining, vigorous, diverse, native (or otherwise approved) plant community is established on the site with a density sufficient to control erosion and re-establish wildlife habitat or forage. Private surface owner rights will be respected when considering desired objectives, vegetation methods, including specific seed mix(s), and soil amendments.

Soil stability would be measured using an erosion condition class/soil surface factor rating method to numerically rate soil movement, surface litter, surface rock, pedestalling, flow patterns, and rill or gully formation. Information obtained through this rating system represents an expression of current erosion activity and can be used to reflect revegetation success as a function of soil stability. These methods are described in BLM Technical Note 346, Erosion Condition Classification System (SSF).

Baseline vegetation communities should be described prior to disturbance. Methods to gather such data should be discussed with the BLM. ESD may be more suitable than baseline conditions because baseline or current plant communities may not represent the ideal or most desirable plant communities for a given area. ESDs are useful for making decisions for plant communities under some type of disturbance, such as fire. In addition, they describe potential, suitable plants for reclamation under a wide range of adverse soil and climatic conditions.

Revegetation success will be determined by the BLM. In general, reclamation success would include the following qualitative and quantitative vegetation parameters:

- Percent of vegetation cover,
- Percent of total ground cover,
- Density of shrub and sub-shrub species,
- Aerial extent of shrub mosaics, and
- Species diversity and species composition.

When ascertaining if reclamation success criteria have been met, the Buffalo Field Office BLM will evaluate basal cover, canopy cover, species diversity, and soil stability to make their determination. The operator may use any BLM approved monitoring method to examine reclamation success.

Interim reclamation success criteria:

1. Disturbed areas not essential for operational function will be re-contoured to allow for restoration of the original landform; soil compaction is relieved and topsoil is respread;
2. The disturbance has been seeded with the approved seed mix;
3. Native, perennial vegetation is becoming established with desirable species and trending towards long-term goal(s) through qualitative or quantitative documentation;
4. Litter, bare ground and desirable vegetation trending to reflect the desired vegetative state and transition of the site as described in the appropriate ESD reference sheet for the site and field verified;
5. Reference areas selection and comparison methodology should be discussed with the BLM and approved by the authorized officer prior to data gathering.
6. Site should be free of all listed species on county, State of Wyoming, or federal noxious weed list;
7. Plants must be resilient as evidenced by well-developed root systems, flowers, and seed heads.

8. The operator has ensured that the site is in stable condition.
9. BLM will make the determination above by evaluating erosional features described in the Erosion Control Classification System (Clark 1980).
10. Erosion control measures are in place to prevent erosion.
11. Such criteria could be measured after a minimum of one growing season, as needed.

Final reclamation success criteria:

In addition to the success criteria listed under interim reclamation the following shall be evaluated:

1. Native Perennial Grasses: Reclaimed sites must have a minimum of 3 native perennial grass species within the overall data summary established in the disturbance area, 1 of which must be a bunchgrass species.
2. Native Perennial Forbs: Reclaimed sites must have a minimum of 3 native perennial forb species within the overall data summary established in the disturbance area.
3. Native Shrubs: Reclaimed sites must have a minimum of 2 native shrub species within the overall data summary established in the disturbance area. Some sub-shrubs may be substituted based on approval by the BLM.
4. Weeds: Sites must be free from all species listed on the county, Wyoming or Federal noxious weed list. All state and federal laws regarding noxious weeds must be followed. Other highly competitive invasive species such as cheatgrass will not exceed 25% of background of an approved BLM reference site and maintains soil surface integrity.
5. Plant Vigor: Plants must be resilient as evidenced by well-developed root systems, lowers, and seed heads. All sites must exhibit the sustainability of the above desired attributes after the removal of external influences .
6. Plant cover and litter is each at 80%, respectively, of the ESD reference sheet or greater of soil surface or background of an approved BLM reference site and maintains soil surface integrity.
7. Bare Ground: Bare ground will not exceed 80% of the ESD reference sheet or background of an approved BLM reference site.
8. Such criteria could be measured after a minimum of two growing seasons.

Monitoring Protocol

Monitoring of reclaimed areas will ensure reclamation success criteria have been met. Reclamation monitoring protocol will be included in the reclamation plan. The authorized officer will be notified by the project proponent when reclamation operations have been completed, meet the success criteria, and are ready for final inspection. For final release BLM will utilize an approved monitoring methodology. Approved monitoring methods are described in BLM Technical Reference 4400-4, 1996 and can be located on the web at: http://www.blm.gov/nstc/library/pdf/samplveg.pdf. Alternative methodologies should be discussed with the BLM.

Appendix P. Wyoming Standards for Healthy Rangelands

P.1. Introduction

According to the Department of the Interior's final rule for grazing administration, effective August 21, 1995, the Wyoming Bureau of Land Management (BLM) State Director is responsible for the development of standards for healthy rangelands and guidelines for livestock grazing management on 18 million acres of Wyoming's public rangelands. The development and application of these standards and guidelines are to achieve the four fundamentals of rangeland health outlined in the grazing regulations (43 Code of Federal Regulations [CFR] 4180.1). Those four fundamentals are: (1) watersheds are functioning properly; (2) water, nutrients, and energy are cycling properly; (3) water quality meets State standards; and (4) habitat for special status species is protected.

Standards address the health, productivity, and sustainability of the BLM-administered public rangelands and represent the minimum acceptable conditions for the public rangelands. The standards apply to all resource uses on public lands. Their application will be determined as use-specific guidelines are developed. Standards are synonymous with goals and are observed on a landscape scale. They describe healthy rangelands rather than important rangeland by-products. The achievement of a standard is determined by measuring appropriate indicators. An indicator is a component of a system whose characteristics (e.g., presence, absence, quantity, and distribution) can be measured based on sound scientific principles.

Guidelines provide for, and guide the development and implementation of, reasonable, responsible, and cost-effective management practices at the grazing allotment and watershed level. The guidelines in this document apply specifically to livestock grazing management practices on the BLM-administered public lands. These management practices will either maintain existing desirable conditions or move rangelands toward statewide standards within reasonable timeframes. Appropriate guidelines will ensure that the resultant management practices reflect the potential for the watershed, consider other uses and natural influences, and balance resource goals with social, cultural/historic, and economic opportunities to sustain viable local communities. Guidelines, like standards, apply statewide.

Implementation of the Wyoming standards and guidelines will generally be done in the following manner. Grazing allotments or groups of allotments in a watershed will be reviewed based on the BLM's current allotment categorization and prioritization process. Allotments with existing management plans and high-priority allotments will be reviewed first. Lower priority allotments will then be reviewed as time allows. The permittees and interested public will be notified when allotments are scheduled for review and are encouraged to participate in the review. The review will first determine if an allotment meets each of the six standards. If it does, no further action will be necessary. If any of the standards aren't being met, rationale explaining the contributing factors will be prepared. If livestock grazing practices are found to be among the contributing factors, corrective actions consistent with the guidelines will be developed and implemented. If a lack of data prohibits the reviewers from determining if a standard is being met, a strategy will be developed to acquire the data in a timely manner.

Quantifiable resource objectives and specific management practices to achieve the standards will be developed at the BLM Field Office level and will consider all reasonable and practical options available to achieve desired results on a watershed or grazing allotment scale. The objectives shall be reflected in site-specific activity or implementation plans as well as in livestock grazing permits/leases for the public lands. Interdisciplinary activity or implementation plans will be used to maintain or achieve the Wyoming standards for healthy rangelands. These plans may be developed formally or informally through mechanisms available and suited to local needs (such as Coordinated Resource Management [CRM] efforts).

On a continuing basis, the Standards for Healthy Rangelands will direct on-the-ground management on public lands. They will serve to focus the ongoing development and implementation of activity plans toward the maintenance or attainment of healthy rangelands.

The development and implementation of standards and guidelines will enable on-the-ground management of the public rangelands to maintain a clear and responsible focus on both the health of the land and its dependent natural and human communities. This development and implementation will ensure that any mechanisms currently being employed or that may be developed in the future will maintain a consistent focus on these essential concerns.

These standards and guidelines are compatible with BLM's three-tiered land use planning process. The first tier includes the laws, regulations, and policies governing BLM's administration and management of the public lands and their uses. The previously mentioned fundamentals of rangeland health specified in 43 CFR 4180.1, the requirement for BLM to develop these state (or regional) standards and guidelines, and the standards and guidelines themselves, are part of this first tier. Also part of this first tier are the specific requirements of various federal laws and the objectives of 43 CFR 4100.2 that require BLM to consider the social and economic well-being of the local communities in its management process.

These standards and guidelines will provide for statewide consistency and guidance in the preparation, amendment, and maintenance of BLM land use plans, which represent the second tier of the planning process. The BLM land use plans provide general allocation decisions concerning the kinds of resource and land uses that can occur on the BLM administered public lands, where they can occur, and the types of conditional requirements under which they can occur. In general, the standards will be the basis for development of planning area-specific management objectives concerning rangeland health and productivity, and the guidelines will direct development of livestock grazing management actions to help accomplish those objectives.

The third tier of the BLM planning process, activity or implementation planning, is directed by the applicable land use plan and, therefore, by the standards and guidelines. The standards and guidelines, as BLM statewide policy, will also directly guide development of the site-specific objectives and the methods and practices used to implement the land use plan decisions. Activity or implementation plans contain objectives which describe the site-specific conditions desired. Grazing permits/leases for the public lands contain terms and conditions which describe specific actions required to attain or maintain the desired conditions. Through monitoring and evaluation, the BLM authorized officer, in consultation with, grazing permittees, and other interested parties determine if progress is being made to achieve activity plan objectives.

Wyoming rangelands support a variety of uses which are of significant economic importance to the state and its communities. These uses include oil and gas production, mining, recreation and tourism, fishing, hunting, wildlife viewing, and livestock grazing. Rangelands also provide amenities which contribute to the quality of life in Wyoming such as open spaces, solitude, and

opportunities for personal renewal. Wyoming's rangelands should be managed with consideration of the state's historical, cultural, and social development and in a manner which contributes to a diverse, balanced, competitive, and resilient economy in order to provide opportunity for economic development. Healthy rangelands can best sustain these uses.

To varying degrees, BLM management of the public lands and resources plays a role in the social and economic well-being of Wyoming communities. The National Environmental Policy Act (part of the above-mentioned first planning tier) and various other laws and regulations mandate the BLM to analyze the socioeconomic impacts of actions occurring on public rangelands. These analyses occur during the environmental analysis process of land use planning (second planning tier), where resource allocations are made, and during the environmental analysis process of activity or implementation planning (third planning tier). In many situations, factors that affect the social and economic well-being of local communities extend far beyond the scope of BLM management or individual public land users' responsibilities. In addition, since standards relate primarily to physical and biological features of the landscape, it is very difficult to provide measurable socioeconomic indicators that relate to the health of rangelands. It is important that standards be realistic and within the control of the land manager and users to achieve.

P.2. Standards for Healthy Public Rangelands

P.2.1. 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.

This Means That:

The hydrologic cycle will be supported by providing for water capture, storage, and sustained release. Adequate energy flow and nutrient cycling through the system will be achieved as optimal plant growth occurs. Plant communities are highly varied within Wyoming.

Indicators May Include But Are Not Limited To:

- Water infiltration rates
- Soil compaction
- Erosion (rills, gullies, pedestals, capping)
- Soil micro-organisms
- Vegetative cover (gully bottoms and slopes)
- Bare ground and litter

The above indicators are applied as appropriate to the potential of the ecological site.

P.2.2. 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.

This Means That:

Wyoming has highly varied riparian and wetland systems on public lands. These systems vary from large rivers to small streams and from springs to large wet meadows. These systems are in various stages of natural cycles and may also reflect other disturbance that is either localized or widespread throughout the watershed. Riparian vegetation captures sediments and associated materials, thus enhancing the nutrient cycle by capturing and utilizing nutrients that would otherwise move through a system unused.

Indicators May Include But Are Not Limited To:

- Erosion and deposition rate
- Channel morphology and floodplain function
- Channel succession and erosion cycle
- Vegetative cover
- Plant composition and diversity (species, age class, structure, successional stages, desired plant community, etc.)
- Bank stability
- Woody debris and instream cover
- Bare ground and litter

The above indicators are applied as appropriate to the potential of the ecological site.

P.2.3. Standard #3

Upland vegetation on each ecological site consists of plant communities appropriate to the site which are resilient, diverse, and able to recover from natural and human disturbance.

This Means That:

In order to maintain desirable conditions and/or recover from disturbance within acceptable timeframes, plant communities must have the components present to support the nutrient cycle and adequate energy flow. Plants depend on nutrients in the soil and energy derived from sunlight. Nutrients stored in the soil are used over and over by plants, animals, and microorganisms. The amount of nutrients available and the speed with which they cycle among plants, animals, and the soil are fundamental components of rangeland health. The amount, timing, and distribution of energy captured through photosynthesis are fundamental to the function of rangeland ecosystems.

Indicators May Include But Are Not Limited To:

- Vegetative cover
- Plant composition and diversity (species, age class, structure, successional stages, desired plant community, etc.)
- Bare ground and litter
- Erosion (rills, gullies, pedestals, capping)
- Water infiltration rates

The above indicators are applied as appropriate to the potential of the ecological site.

P.2.4. 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 will be maintained or enhanced.

This Means That:

The management of Wyoming rangelands will achieve or maintain adequate habitat conditions that support diverse plant and animal species. These may include listed Threatened or Endangered species (U.S. Fish and Wildlife-designated), species of special concern (BLM-designated), and other sensitive species (State of Wyoming-designated). The intent of this standard is to allow the listed species to recover and be delisted.

Indicators May Include But Are Not Limited To:
- Noxious weeds
- Species diversity
- Age class distribution
- All indicators associated with the upland and riparian standards
- Population trends
- Habitat fragmentation

The above indicators are applied as appropriate to the potential of the ecological site.

P.2.5. Standard #5

Water quality meets State standards.

This Means That:

The State of Wyoming is authorized to administer the Clean Water Act. BLM management actions or use authorizations will comply with all federal and state water quality laws, rules and regulations to address water quality issues that originate on public lands. Provisions for the establishment of water quality standards are included in the Clean Water Act, as amended, and the Wyoming Environmental Quality Act, as amended. Regulations are found in Part 40 of the CFR and in Wyoming's Water Quality Rules and Regulations. The latter regulations contain Quality Standards for Wyoming Surface Waters.

Natural processes and human actions influence the chemical, physical, and biological characteristics of water. Water quality varies from place to place with the seasons, the climate, and the kind substrate through which water moves. Therefore, the assessment of water quality takes these factors into account.

Indicators May Include But Are Not Limited To:
- Chemical characteristics (e.g., pH, conductivity, dissolved oxygen)
- Physical characteristics (e.g., sediment, temperature, color)
- Biological characteristics (e.g., macro- and micro-invertebrates, fecal coliform, and plant and animal species)

P.2.6. Standard #6

Air quality meets State standards.

This Means That:

The State of Wyoming is authorized to administer the Clean Air Act. BLM management actions or use authorizations will comply with all federal and state air quality laws, rules, regulations and standards. Provisions for the establishment of air quality standards are included in the Clean Air Act, as amended, and the Wyoming Environmental Quality Act, as amended. Regulations are found in Part 40 of the CFR and in Wyoming Air Quality Standards and Regulations.

Indicators May Include But Are Not Limited To:

- Particulate matter
- Sulfur dioxide
- Photochemical oxidants (ozone)
- Volatile organic compounds (hydrocarbons)
- Nitrogen oxides
- Carbon monoxide
- Odors
- Visibility

P.3. BLM Wyoming Guidelines for Livestock Grazing Management

1. Timing, duration, and levels of authorized grazing will ensure that adequate amounts of vegetative ground cover, including standing plant material and litter, remain after authorized use to support infiltration, maintain soil moisture storage, stabilize soils, allow the release of sufficient water to maintain system function, and to maintain subsurface soil conditions that support permeability rates and other processes appropriate to the site.
2. Grazing management practices should restore, maintain, or improve riparian plant communities. Grazing management strategies consider hydrology, physical attributes, and potential for the watershed and the ecological site. Grazing management should maintain adequate residual plant cover to provide for plant recovery, residual forage, sediment capture, energy dissipation, and groundwater recharge.
3. Range improvement practices (instream structures, fences, water troughs, etc.) in and adjacent to riparian areas will ensure that stream channel morphology (e.g., gradient, width/depth ratio, channel roughness and sinuosity) and functions appropriate to climate and landform are maintained or enhanced. The development of springs, seeps, or other projects affecting water and associated resources shall be designed to protect the ecological and hydrological functions, wildlife habitat, and significant cultural, historical, and archaeological values associated with the water source. Range improvements will be located away from riparian areas if they conflict with achieving or maintaining riparian function.
4. Grazing practices that consider the biotic communities as more than just a forage base will be designed in order to ensure that the appropriate kinds and amounts of soil organisms, plants, and animals to support the hydrologic cycle, nutrient cycle, and energy flow are maintained or enhanced.
5. Continuous season-long or other grazing management practices that hinder the completion of plants' life-sustaining reproductive and/or nutrient cycling processes will be modified to

ensure adequate periods of rest at the appropriate times. The rest periods will provide for seedling establishment or other necessary processes at levels sufficient to move the ecological site condition toward the resource objective and subsequent achievement of the standard.

6. Grazing management practices and range improvements will adequately protect vegetative cover and physical conditions and maintain, restore, or enhance water quality to meet resource objectives. The effects of new range improvements (water developments, fences, etc.) on the health and function of rangelands will be carefully considered prior to their implementation.
7. Grazing management practices will incorporate the kinds and amounts of use that will restore, maintain, or enhance habitats to assist in the recovery of federal Threatened and Endangered species or the conservation of federally-listed species of concern and other state-designated special status species. Grazing management practices will maintain existing habitat or facilitate vegetation change toward desired habitats. Grazing management will consider Threatened and Endangered species and their habitats.
8. Grazing management practices and range improvements will be designed to maintain or promote the physical and biological conditions necessary to sustain native animal populations and plant communities. This will involve emphasizing native plant species in the support of ecological function and incorporating the use of nonnative species only in those situations in which native plant species are not available in sufficient quantities or are incapable of maintaining or achieving properly functioning conditions and biological health.
9. Grazing management practices on uplands will maintain desired plant communities or facilitate change toward desired plant communities.

P.3.1. Definitions

Activity Plans – Allotment Management Plans (AMPs), Habitat Management Plans (HMPs), Watershed Management Plans, Wild Horse Management Plans, and other plans developed at the local level to address specific concerns and accomplish specific objectives.

Coordinated Resource Management (CRM) – A group of people working together to develop common resource goals and resolve natural resource concerns. CRM is a people process that strives for win-win situations through consensus-based decision making.

Desired Plant Community – A plant community which produces the kind, proportion, and amount of vegetation necessary for meeting or exceeding the land use plan/activity plan objectives established for an ecological site(s). The desired plant community must be consistent with the site's capability to produce the desired vegetation through management, land treatment, or a combination of the two.

Ecological Site – An area of land with specific physical characteristics that differs from other areas both in its ability to produce distinctive kinds and amounts of vegetation and in its response to management.

Erosion – (v.) Detachment and movement of soil or rock fragments by water, wind, ice, or gravity. (n.) The land surface worn away by running water, wind, ice, or other geological agents, including such processes as gravitational creep.

Grazing Management Practices – Grazing management practices include such things as grazing systems (rest-rotation, deferred rotation, etc.), timing and duration of grazing, herding, salting, etc. They do not include physical range improvements.

Guidelines (For Grazing Management) – Guidelines provide for, and guide the development and implementation of, reasonable, responsible, and cost-effective management actions at the allotment and watershed level which move rangelands toward statewide standards or maintain existing desirable conditions. Appropriate guidelines will ensure that the resultant management actions reflect the potential for the watershed, consider other uses and natural influences, and balance resource goals with social, cultural/historic, and economic opportunities to sustain viable local communities. Guidelines, and, therefore, the management actions they engender, are based on sound science, past and present management experience, and public input.

Indicator – An indicator is a component of a system whose characteristics (e.g., presence, absence, quantity, and distribution) can be measured based on sound scientific principles. An indicator can be measured (monitored and evaluated) at a site- or species-specific level. Measurement of an indicator must be able to show change within timeframes acceptable to management and be capable of showing how the health of the ecosystem is changing in response to specific management actions. Selection of the appropriate indicators to be monitored in a particular allotment is a critical aspect of early communication among the interests involved on the ground. The most useful indicators are those for which change or trend can be easily quantified and for which agreement as to the significance of the indicator is broad based.

Litter – The uppermost layer of organic debris on the soil surface, essentially the freshly fallen or slightly decomposed vegetal material.

Management Actions – Management actions are the specific actions prescribed by the BLM to achieve resource objectives, land use allocations, or other program or multiple use goals. Management actions include both grazing management practices and range improvements.

Objective – An objective is a site-specific statement of a desired rangeland condition. It may contain qualitative (subjective) elements, but it must have quantitative (objective) elements so that it can be measured. Objectives frequently speak to change. They may measure the avoidance of negative changes or the accomplishment of positive changes. They are the focus of monitoring and evaluation activities at the local level. Objectives may measure the products of an area rather than its ability to produce them, but if they do so, it must be kept in mind that the lack of a product may not mean that the standards have not been met. Instead, the lack of a particular product may reflect other factors such as political or social constraints. Objectives often focus on indicators of greatest interest for the area in question.

Range Improvements – Range improvements include such things as corrals, fences, water developments (reservoirs, spring developments, pipelines, wells, etc.) and land treatments (prescribed fire, herbicide treatments, mechanical treatments, etc.).

Rangeland – Land on which the native vegetation (climax or natural potential) is predominantly grasses, grass-like plants, forbs, or shrubs. This includes lands revegetated naturally or artificially when routine management of that vegetation is accomplished mainly through manipulation of grazing. Rangelands include natural grasslands, savannas, shrublands, most deserts, tundra, alpine communities, coastal marshes, and wet meadows.

Rangeland Health – The degree to which the integrity of the soil and ecological processes of rangeland ecosystems are sustained.

Riparian – An area of land directly influenced by permanent water. It has visible vegetation or physical characteristics reflective of permanent water influence. Lakeshores and streambanks are

typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not have vegetation dependent on free water in the soil.

Standards – Standards are synonymous with goals and are observed on a landscape scale. Standards apply to rangeland health and not to the important by-products of healthy rangelands. Standards relate to the current capability or realistic potential of a specific site to produce these by-products, not to the presence or absence of the products themselves. It is the sustainability of the processes, or rangeland health, that produces these by-products.

Terms and Conditions – Terms and conditions are very specific land use requirements that are made a part of the land use authorization in order to assure maintenance or attainment of the standard. Terms and conditions may incorporate or reference the appropriate portions of activity plans (e.g., AMPs). In other words, where an activity plan exists that contains objectives focused on meeting the standards, compliance with the plan may be the only term and condition necessary in that allotment.

Upland – Those portions of the landscape which do not receive additional moisture for plant growth from run-off, streamflow, etc. Typically these are hills, ridgetops, valley slopes, and rolling plains.

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Appendix Q. Fire and Fuels Management

Q.1. Emergency Stabilization and Rehabilitation

Introduction

Emergency stabilization plans and/or rehabilitation plans are prepared after a wildland fire to minimize threats to life or property and stabilize and prevent unacceptable degradation to natural and cultural resources resulting from the effects of the fire. Not all fires need emergency stabilization and/or rehabilitation.

Wyoming Bureau of Land Management's (BLM) Reclamation policy identifies certain requirements which must be addressed when developing reclamation plans or proposals for surface-disturbing activities. For information about reclamation requirements, please refer to Appendix O (p. 2495).

The Burned Area Emergency Stabilization and Rehabilitation Handbook (BLM 2007c) provides detailed information specific to BLM policies, standards, and procedures used in the Burned Area Emergency Stabilization and Rehabilitation (ES&R) programs. The Handbook is intended to be the primary guidance to BLM ES&R activities. ES&R activities and treatment undertaken in the Buffalo Field Office will follow the Handbook guidance. As updates and revisions to the departmental manuals are completed, conformance to the new direction will supersede the criteria included herein.

Emergency stabilization is defined as "Planned actions to stabilize and prevent unacceptable degradation to natural and cultural resources, to minimize threats to life and property resulting from the effects of a fire, or to repair/replace/construct physical improvements necessary to prevent degradation of land or resources. Emergency stabilization actions must be taken within one year following containment of a wildland fire" (DOI 2004).

Rehabilitation is defined as "Efforts undertaken within three years of containment of a wildland fire to repair or improve fire-damaged lands unlikely to recover naturally to management approved conditions, or to repair or replace minor facilities damaged by fire" (DOI 2004).

ES&R funds are not used for rehabilitation of wildland fire suppression efforts; this includes rehabilitating firelines, helispots, fire camp, etc. Costs for rehabilitating wildland fire suppression efforts will be funded by the wildland fire project code.

Emergency Stabilization and Rehabilitation Protocols

Emergency stabilization protection priorities are: (1) human life and safety; and (2) property and unique biological resources (designated critical habitat for federal and state listed, proposed or candidate Threatened and Endangered species) and significant heritage sites (DOI 2004). Burned area rehabilitation protection priorities are: (1) to repair or improve lands damaged directly by a wildland fire; and (2) to rehabilitate or establish healthy, stable ecosystems in the burned area (DOI 2004).

Emergency Stabilization

The objective of emergency stabilization is "To determine the need for and to prescribe and implement emergency treatments to minimize threats to life or property or to stabilize and prevent unacceptable degradation to natural and cultural resources resulting from the effects of a fire" (DOI 2004).

Emergency stabilization plans are prepared by an interdisciplinary team, immediately following a wildland fire and specify emergency treatments and activities to be carried out within one year following containment of the wildfire. Generally, activities are only prescribed within the perimeter of a burned area.

Allowable emergency stabilization actions are limited to the following items, grouped by issue topic:

Human Life and Safety

- Replacing or repairing minor facilities essential to public health and safety when no other protection options are available.

Soil/Water Stabilization

- Placing structures to slow soil and water movement.
- Stabilizing soil to prevent loss of degradation or productivity.
- Increasing road drainage frequency and/or capacity to handle additional post-fire runoff.
- Installing protective fences or barriers to protect treated or recovering areas.

Designated Critical Habitat for Federal/State Listed, Proposed, or Candidate Species

- Conducting assessments of critical habitat in those areas affected by emergency stabilization treatments.
- Seeding or planting to prevent permanent impairment of designated critical habitat for federal and state listed, proposed or candidate Threatened and Endangered species.

Critical Heritage Resources

- Conducting assessments of significant heritage sites in those areas affected by emergency stabilization treatments.
- Stabilizing critical heritage resources.
- Patrolling, camouflaging, burying significant heritage sites to prevent looting.

Invasive Plants

- Seeding to prevent establishment of invasive plants, and direct treatment of invasive plants. Such actions will be specified in the emergency stabilization plan only when immediate action is required and when standard treatments are used that have been validated by monitoring data from previous projects, or when there is documented research establishing the effectiveness of such actions.

- Using integrated pest management techniques to minimize the establishment of non-native invasive species within the burned area. When there is an existing approved management plan that addresses non-native invasive species, emergency stabilization treatments may be used to stabilize the invasive species

Monitoring

- Monitoring of treatments and activities for up to three years from date of fire containment.

Burned Area Rehabilitation

The objectives of rehabilitation are: (1) to evaluate actual and potential long-term post-fire impacts to critical cultural and natural resources and identify those areas unlikely to recover naturally from severe wildland fire damage; (2) to develop and implement cost-effective plans to emulate historical or pre-fire ecosystem structure, function, diversity, and dynamics consistent with approved land management plans, or if that is infeasible, then to restore or establish a healthy, stable ecosystem in which native species are well represented; and (3) to repair or replace minor facilities damaged by wildland fire (DOI 2004).

Rehabilitation plans are prepared by an interdisciplinary team as a separate plan, independent of an emergency stabilization plan. The rehabilitation plan specifies non-emergency treatments and activities to be carried out within three years following containment of a wildfire. Generally, rehabilitation activities are prescribed only within the perimeter of a burned area.

Allowable rehabilitation actions are limited to the following items, grouped by issue topic:

Lands Unlikely to Recover Naturally

- Repair or improve lands unlikely to recover naturally from wildland fire damage by emulating historical or pre-fire ecosystem structure, function, diversity, and dynamics consistent with existing land management plans.

Weed Treatments

- Chemical, manual, and mechanical removal of invasive species, and planting of native and non-native species, restore or establish a healthy, stable ecosystem even if this ecosystem cannot fully emulate historical or pre-fire conditions.

Tree Planting

- Tree planting to reestablish burned habitat, reestablish native tree species lost in fire, prevent establishment of invasive plants.

Repair/Replace Fire Damage to Minor Facilities

- Repair or replace fire damage to minor operating facilities (e.g., fences, campgrounds, interpretive signs and exhibits, shade shelters, wildlife guzzlers, etc.) Rehabilitation may not include the planning or replacement of major infrastructure, such as visitor centers, residential

structures, administration offices, work centers and similar facilities. Rehabilitation does not include the construction of new facilities that did not exist before the fire, except for temporary and minor facilities necessary to implement burned area rehabilitation efforts.

Monitoring

- Monitoring of treatments and activities for up to three years from date of fire containment.

Policies on timeframes for ES&R planning funding, and implementation are very specific. ES&R treatments must be implemented, to the extent possible, before additional damage occurs to the burned area, immediately down slope of the burned area, or before undesirable vegetation becomes established. Treatments must be implemented at a time that will ensure a high or maximum probability of success. The ES&R Program timeframes in relations to tasks and responsibilities are shown in Table Q.1, "Emergency Stabilization and Rehabilitation Program Timeframes, Tasks, and Responsibilities" (p. 2514).

Table Q.1. Emergency Stabilization and Rehabilitation Program Timeframes, Tasks, and Responsibilities

Event	Timeframes	Task
Wildfire occurs	Immediately, prior to fire containment	Manager assigns a Resource Advisor. While the fire is still burning, the Resource Advisor, in consultation with resource specialists and the appropriate Manager, decides if ES&R is warranted bases on Values-at-Risk/Resources-at-Risk.
Initial Emergency Stabilization Plan needed. Submit Form 1310-2 plus supplemental attachments (Both 2822 and 2881 may be indicated on Form, though funding under 2881 may not occur until the following fiscal year)	Within 7 days of fire containment	Concurrently to State ES&R Program Lead, National ES&R Program Lead, and Denver Budget Office (BC-612).
Complete Emergency Stabilization Plan needed. Prepare/Submit complete Emergency Stabilization Plan	Within 21 days of fire containment	Less than $100,000 submit to State ES&R Program Lead. Greater than or equal to $100,000 submit to State ES&R Program Lead (for review) and concurrently to National ES&R Program Lead.
Receive approval/disapproval of Emergency Stabilization Plan	Within 6 working days of receipt by Approval Office	Requesting Office receives memo approving funding, or need for revision on a plan by plan basis. State Director or acting has funding approval authority for plans less than $100,000. Bureau of Land Management Budget Officer, after concurrence with Assistant Director WO-200 or their designee, has funding approval authority for plans greater than or equal to $100,000.
Receive notification of Emergency Stabilization funding approval	Immediately	Local fire office enters project data into NFPORS.

Event	Timeframes	Task
BAR Plan needed. Prepare/Submit BAR Plan	Timely, ideally soon after submitting Emergency Stabilization Plan, but no later than September 5 annually	To State ES&R Program Lead and National ES&R Program Lead. Field Office. Local fire office enters project data into NFPORS.
Receive approval/disapproval of BAR Plan funding	Before October 31 annually	Funding for BAR Plans is approved via the Annual Work Plan.
Accomplishment Report and Funding Request Form for next Fiscal Year 2881 funds	Early September	To State ES&R Program Lead for review and submission to National ES&R Program Lead for concurrence. Funding for years 2 and 3 is approved via the Annual Work Plan.
Close-out Report	Early September of 3rd year	To State ES&R Program Lead for review and submission to National ES&R Program Lead.
BAR Burned Area Rehabilitation ES&R Emergency Stabilization and Rehabilitation NFPORS National Fire Plan Operations and Reporting System WO Washington Office		

Due to the broad spectrum of situations encountered in emergency stabilization and/or rehabilitation, several options of possible treatments, either separately or in combination, must be considered. The ES&R Handbook list several treatments under the Treatment Guidance section.

Emergency Stabilization and Rehabilitation Guidelines for Wilderness Study Areas

Emergency stabilization and/or rehabilitation following wildland fire in a Wilderness Study Area (WSA) will comply with Manual 6330 - Management of Wilderness Study Areas (BLM 2012c). The following italicized te xt condenses excerpts from the manual:

Emergency stabilization, rehabilitation, and restoration of the wilderness resource created by impacts from wildfires must satisfy the non-impairment criteria unless an exception applies. These activities will be more intensive: where the effects of the fire were greater than would occur in an area where fire already plays its natural role on the landscape; in ecosystems that evolved without broad-scale fire; and for fires whose effects (even within the natural range) pose an unacceptable risk to life, property, or resources outside the WSA. Where wildfires have been managed for resource benefits, most stabilization, rehabilitation, and restoration activities are expected to be limited to the impacts caused by direct management actions or to prevent the spread of exotic vegetation. These activities will not be used to establish, or re-establish, conditions not provided for in sections 1.6.D.8 or 1.6.D.11 of this manual.

Any emergency stabilization and/or rehabilitation actions must maintain an area's suitability for preservation as wilderness and should be accomplished using methods and equipment that causes the least damage to wilderness resources. The use of motorized vehicles and mechanical equipment will be minimized to the extent possible.

When seeding is considered, the appropriate species and methods for seeding will be considered on a case-by-case basis to determine if the proposed method meets the policy and guidelines for WSAs. Seed and planting will utilize native species, and will minimize cross-country use of motorized equipment. Seedings and plantings will be staggered or irregular so as to avoid a straight-line plantation appearance. Seed will be applied aerially unless the area to be stabilized

and/or rehabilitated is small, or ground application will not impair wilderness characteristics. Because the covering of seed greatly affects its successful germination, mechanized equipment may be considered to cover the seed after aerial application. If the burned area is determined to be crucial wildlife habitat, and shrub seed is not applied aerially, then seedlings may be hand planted.

When a proposed emergency stabilization and/or rehabilitation project addresses a WSA, interested parties will be allowed a 30-day comment period on the proposed treatment, unless it is not possible to do so because of emergency conditions (i.e., the 30-day comment period would result in missing the optimum period for treatment). If a full 30-day period would result in missing the optimum period for emergency stabilization and/or rehabilitation, key contacts would be notified for immediate comment, and a follow up copy of the treatment prescription would be forwarded.

If it is determined that wilderness suitability is affected by damages from fire suppression actions, the disturbance must be repaired by fire suppression resources. ES&R funds may not be used to repair suppression damages.

Q.2. Fire Management Policy for Wilderness Study Areas

The following paragraphs are condensed excerpts from Manual 6330 - Management of Wilderness Study Areas (BLM 2012c). For complete policy and guidance regarding WSAs, refer to the manual.

Policies for Specific Activities — Vegetation

Whenever possible, natural processes will be relied on to maintain native vegetation and to influence natural fluctuations in populations. Natural disturbance processes, including fire, insect outbreaks, and droughts, are important functions of the ecosystem. Manipulation of vegetation through management-ignited fire, chemical application, mechanical treatment, or human controlled biological means is allowed only where it meets the non-impairment standard or one of the exceptions. Exceptions that may pertain to vegetative treatment include emergencies, the protection or enhancement of wilderness characteristics, grandfathered uses, valid existing rights, and actions taken to recover a federally listed Threatened, Endangered, or Candidate species. Establishing non-native plants is an example of vegetation management that may impair and therefore may not be permitted within a WSA.

Emergencies:
As an exception to the non-impairment standard, vegetative manipulation in emergency situations may be allowed, e.g., there is no effective alternative for controlling insect and disease outbreaks or fires that threaten lands outside of a WSA. Reseeding or planting of native species may be undertaken following fire or other natural disaster if natural seed sources are not adequate to compete with non-native vegetation or substantial soil loss is expected.

Insect and Disease Control:
Native insect and disease control activities on vegetation will be allowed only to the extent that they meet the non-impairment criteria or one of the exceptions. When specific insects and diseases are documented to be non-native or introduced organisms, then it may be reasonable to consider whether the protection and enhancement of wilderness characteristics exception to the non-impairment standard applies.

Restoration:
Where it meets the non-impairment standard or one of the exceptions, management action may be taken to restore vegetation to characteristic conditions of the ecological zone in which the area is situated where:

- natural successional processes have been disrupted by past human activity, to the extent that intervention is necessary in order to return the ecosystem to a condition where natural process can function;
- restoration through natural processes would require lengthy periods of time during which the impacted area would receive unwanted human use or be susceptible to substantial soil loss without intervention, or further ecological departure would occur; or,
- it is necessary to maintain fire-dependent ecosystems when adjacent land uses do not allow for natural fire occurrence. (see section 1.6.D.2.c).

Manipulation should only occur when restoration by natural forces is no longer attainable, and only to restore or maintain vegetative communities to the closest approximation of the natural range of conditions.

Restoration treatments should use the least disruptive techniques that have the best likelihood for success. Patient, incremental treatments should be favored over aggressive attempts to restore long-term changes all at once, unless repeated treatments would pose greater impairment risk to wilderness characteristics.

Policies for Specific Activities — Fire

The overall goal of managing fire in WSAs is to allow the frequency and intensity of the natural fire regime to play its inherent role in the ecosystem. This means both allowing fire where ecosystems evolved in the presence of fire, and preventing unnatural spread of fire in ecosystems that evolved without broad-scale fires.

Wildfires can be considered emergencies and, as such, management response to a wildfire falls under one of the exceptions to the non-impairment criteria. Nevertheless, the non-impairment criteria will be met to the extent practical. This means using "minimum impact suppression tactics" or "light hand on the land" suppression techniques wherever possible, while providing for the safety of firefighters and the public and meeting fire management objectives. Fire managers should inform suppression personnel during dispatch that the [wild]fire is in a WSA and that special constraints may apply to prevent impairment of wilderness characteristics. A fire resource advisor with experience in WSA management should be assigned to all fires in WSAs to assist in the protection of wilderness characteristics.

The goal of prescribed fire is to make conditions possible for natural fire to return to the WSA. In some instances, the goal may be to mimic a natural fire regime where reliance on wildfire is not feasible. Use of prescribed fires in WSAs is limited to instances where this use meets the non-impairment standard or one of the exceptions, such as to clearly protect or enhance the land's wilderness characteristics. The BLM may utilize prescribed fire in WSAs where the natural role of fire cannot be returned solely by reliance on wildfire or where relying on wildfires might create unacceptable risks to life, property, or natural resources outside the WSA.

Fuel treatments include thinning or removing vegetation, either mechanically or chemically, in advance of, or as a replacement for, wildland fire (either wildfire or prescribed fire). The goal of fuel treatment is to make conditions possible for natural wildfire to return to the WSA. In some

instances, fuel treatment may be necessary to protect site-specific resources in advance of a prescribed fire to prevent the loss of those resources. This necessity must be clearly demonstrated in the prescribed fire plan. Pre-fire treatment used to replace either type of wildland fire…is only allowed in WSAs where it meets the non-impairment standard or one of the exceptions. Due to their controversial nature and the complexities of analyzing the effects of these treatments on the non-impairment criteria, more extensive National Environmental Policy Act (NEPA) analysis (e.g., an Environmental Impact Statement) including public involvement may be required when fuel treatments are proposed for use as a replacement for wildland fire. The policy in 1.6.D.8.b.iii [vegetation restoration] must be satisfied. Fuel treatments *may* be permitted under the restoration or public safety exceptions to the non-impairment standard when:

A. prescribed fire in the WSA will inevitably cause unacceptable risks to life, property, or natural resources outside the WSA; or
B. natural successional processes have been disrupted by past human activity to the extent that intervention is necessary in order to return the ecosystem to a condition where natural process can function; or
C. non-native species have altered the fire regime so that wildland fires pose an undue risk to the native ecosystem.

Conclusive documentation of A, B, or C, above, must be included in the NEPA analysis of the proposed action. When fuel treatment is allowed, the BLM must strive to achieve the desired conditions through the least impacting method. Fuel treatments should not be authorized in a WSA if the same objectives can be accomplished by the BLM through fuel treatments on public lands outside of the WSA.

Appendix R. Travel and Transportation Management

The Bureau of Land Management's (BLM) present transportation network has been largely created from past resource uses and public access patterns. In order to effectively manage for a complete and comprehensive transportation network throughout the BLM-administered public lands within the Buffalo Field Office (BFO), the BLM must assess present and future access needs; evaluate existing trails, primitive roads, and roads; and determine an appropriate travel and transportation system.

As required by Executive Order (EO) 11644 (as amended by EO 11989) and regulation (43 Code of Federal Regulations [CFR] 8340), and in conformance with the BLM Washington Office Instruction Memorandum (IM) No. 2008-014 (BLM 2007e) and Manual 1626 - Travel and Transportation Management (BLM 2011a), BLM-administered lands within the BFO are identified as "Limited to Designated Roads and Trails," "Closed," or "Open" (Map 65). Those areas that are designated "Limited" may have seasonal restrictions or travel limitations to designated roads and vehicle routes. A travel management plan designating roads Open for motorized and nonmotorized use throughout the BFO will be completed for each Travel Management Area (TMA). A conscientious effort, subject to financial and resource availability, will be made to complete these plans within five years of the signing of the Resource Management Plan (RMP) Record of Decision (ROD). TMA planning will be accomplished through a community-based process by involving cooperating agencies, community groups, and special interest groups. Modifications to the transportation network (new routes, reroutes, or closures) in "Limited" areas may be made through activity level planning or with site-specific National Environmental Policy Act (NEPA) analysis. Modifications to off-highway vehicle (OHV) designations (Open, Closed, or Limited) require an RMP amendment.

Developing a Travel and Transportation Management Network

During the development of a travel management plan, the BLM will seek to balance access needs of motorized and nonmotorized users while sustaining the natural and cultural resources. Through site-specific planning, roads and trails will be inventoried, mapped, and analyzed as necessary to evaluate and designate the roads and trails as "Open," "Seasonally Open," or "Closed" to various types of use (foot, equestrian, bicycle, motorized, and others). Site-specific planning includes identifying opportunities for trail construction or improvement of specific areas where intensive use may be appropriate. Intensive use areas may be identified with use restricted to designated trails under the Limited designation.

Off-Highway Vehicle Designations

Specific criteria for "Open," "Limited," and "Closed" OHV designations are provided in definitions outlined in 43 CFR 8340.0-5 (f), (g), and (h) and 43 CFR 8342.1, Designation Criteria. Generally, the BLM will designate Limited areas where use is limited to identified existing roads and trails (Limited to existing) or emphasize the designation of travel networks (Limited to designated). The following further clarifies these designations:

- **Open:** Areas designated as Open are intended for intensive OHV or other transportation use areas where all types of vehicle use is permitted at all times, anywhere in the area subject to the operating regulations and vehicle standards set forth in 43 CFR 8341 and 8342.
- **Closed:** Areas where OHV use is prohibited. Areas, roads, and/or trails are designated Closed if closure to all OHV use is necessary to protect resources, promote visitor safety, or reduce user conflicts. Administrative use of motor vehicles may be allowed within these areas.
- **Limited:** Areas where transportation use must be restricted to meet specific objectives. For areas classified as Limited, the BLM must consider a full range of possibilities, including travel that will be limited to types or modes of travel; limited to identified roads and trails; limited to time or season of use; limited to certain types of vehicles (i.e., OHVs, motorcycles, all-terrain vehicles, high clearance, etc.); limited to authorized or permitted vehicles or users; limited to BLM administrative use only; or other types of limitations. In addition, the BLM must provide specific guidance about the process for managing motorized vehicle access for authorized, permitted, or otherwise approved vehicles for those specific categories of motorized vehicle uses that are exempt from a Limited OHV designation.

Travel and Transportation Planning Process

Motorized travel in areas to be managed as designated roads and trails will be limited to existing roads, primitive roads, and trails prior to the formal designation of routes. In areas where the travel network has been inventoried and travel routes have been defined, only designated routes will be open for travel prior to the completion of a new travel management plan. Areas currently limited to designated routes include Burnt Hollow, Middle Fork, Welch Ranch and Weston Hills Management Areas.

Travel Management Area Delineation

TMAs will be delineated for the entire field office. TMAs will often consist of other designated management areas (i.e., Special Recreation Management Areas [SRMAs], Wildlife Management Areas, etc.). Topography, land tenure and ecosystem types will also assist in delineation of TMAs. Initial TMAs include individual SRMAs, Wilderness Study Areas (WSAs), and the Powder River Basin. Modifications to TMAs will occur through interdisciplinary team review prior to beginning subsequent NEPA documentation for travel planning.

For areas managed as "Limited to designated roads and trails" (Map 65), a travel management plan will be developed that defines designated motorized and nonmotorized transportation networks. These travel management plans will be developed to address site-specific, geographical areas identified as TMAs. The TMAs will be prioritized in response to current issues such as current OHV use, areas with sensitive resources, areas with special or specific designations (i.e., Areas of Critical Environmental Concern, SRMAs, Wildlife Habitat Management Areas, etc.), public health and safety, use and user conflicts, and resource protection.

Travel and Transportation Management (TTM) planning guidance (H-1601-Land Use Planning Handbook) (BLM 2005b), Appendix C; Manual 1626 - Travel and Transportation Management (BLM 2011a) requires a completed travel and transportation network upon completion of the Land Use plan to the extent possible. If this is not possible, a preliminary network must be identified and a process established to select a final travel management network. Determination of the final travel and transportation network for the BFO has been deferred until the completion of

the Buffalo RMP because of the complexity of the road network and land tenure pattern, and the need to verify the roads and trails inventory for the planning area.

In general, TTM for designated roads and trails includes the following:

- During the planning process, teams made up of BLM, cooperating agencies, and members of the public will be used to ensure resource concerns and OHV user needs are properly addressed. Maps will be available to the teams that include all known roads to aid identification of roads and vehicle routes to be considered for designation as Open to OHV use.
- From inventory data, complete a map of the TMA, and identify the baseline of roads, primitive roads, and trails. The BFO travel network is only partially inventoried. Map 60 illustrates the preliminary transportation network for the BFO. Aerial photos and satellite imagery will be used to establish which routes existed at the time of the ROD. The final travel and transportation network will not be designated until the inventory is completed.

The following steps outline the process in completing a travel and transportation inventory:

1. Acquire funding to be used to inventory data in each TMA for those areas known to have an incomplete route inventory.

2. Analyze aerial photos, satellite imagery and Geographic Information Systems data to collect route data.

3. Data collected from aerial photos and satellite imagery will be ground truthed.

4. Existing routes will be assigned a definition, interim route category, and interim maintenance level and a map will be prepared for each TMA. (Note: Final designations will not take place until the completion of the travel management plan.)

A travel management plan will be prepared for each TMA using an interdisciplinary approach. Goals and objectives will be defined for each TMA. Each travel management plan will include a clear and concise purpose and need statement and alternatives for the designated road network will be prepared.

Route Designation Criteria

The following factors are considered when developing route designations:

- Are resource conflicts present?
- Are critical resources such as Threatened and Endangered or WSAs present?
- Are high-priority resources such as crucial wildlife habitat, cultural or paleontological sites present?
- What are management objectives for the area?
- What are the travel and transportation needs in the area?
- Is there evidence of OHV- related problems?
- Are needs and desires of public land users being met?
- Is visitor use high or low?
- How would OHV proposals affect activity and experience opportunities in the area?
- What benefits or outcomes would accrue from various options?
- Are other issues or problems present (noxious weeds, etc.)?
- Are sufficient data sources available to support the decision?
- Are budget and manpower resources sufficient to implement this designation?

All route designations shall be based on protecting public land resources, the promotion of user safety, and the minimization of conflicts amongst the various public land uses; and in accordance with the following criteria:

- Routes shall be located to minimize damage to soil, watershed, vegetation, air, cultural or other public land resources, and to prevent impairment of wilderness suitability in relevant areas.
- Routes shall be located to minimize harassment of wildlife or major disruption of wildlife habitats. Special attention will be given to protect Threatened or Endangered species and their habitats.
- Routes shall be located to minimize conflicts between off-road vehicle use and other existing or proposed recreational uses of the same or neighboring public lands, and to ensure the compatibility of such uses with existing conditions in populated areas, taking into account visibility, noise and other factors.
- Motorized areas and routes shall not be located in officially designated wilderness areas or primitive areas. Motorized areas and routes shall be located in natural areas only if the authorized officer determines that off-road vehicle use in such locations will not adversely affect their natural, aesthetic, scenic, or other values for which such areas are established.

A subsequent NEPA document will be developed with an array of alternatives that will identify the travel routes open for motorized use. The document must address all modes of transportation and primary use for the TMA. Additionally, the plan should identify maintenance intensities and legal access needs and indicate changes in the status of existing routes and areas. The plan will also address necessary improvements, trailheads, staging areas and signs, where applicable.

The public will be notified of the objective of the proposed travel management plan and of scoping meetings through local media, as appropriate, to reach the potentially affected user groups. Resource Advisory Councils, local government, state and federal agencies, gateway communities, and local organizations, as applicable, will be invited. Maps of the planning area will be prepared and available to facilitate discussion in identifying public issues, concerns, and access needs.

Substantive public comments will be incorporated into the travel management plan, the NEPA document will be completed and the signed Finding Of No Signification Impact and Decision Record made available for public review. Completion of the travel management plan for a TMA will establish a transportation network for a particular TMA through the identification of roads, primitive roads, and trails as “Open,” “Limited,” or “Closed” for a particular use.

The travel management plan will be implemented on the ground which will include corresponding public information, education, and signing efforts. Please refer to the TTM Implementation section for further information.

Upon completion of the travel management plan and subsequent NEPA document, the final travel and transportation network will be published in the Federal Register notice, where required.

Definitions, route categories, and maintenance levels of all of the designated routes will be entered into the Facility Asset Management System (FAMS).

A map will be produced and made available to the public depicting the designated roads, primitive roads, trails and permitted uses.

As per 43 CFR 8342.3, the BLM will monitor effects of the off-road vehicle use within TMAs. The BLM may amend, revise, or revoke designated routes, or take other actions to address any issues identified through monitoring. Additionally, where off-road vehicles are causing or will

cause considerable adverse effects upon soil, vegetation, wildlife, wildlife habitat, cultural resources, historical resources, threatened or endangered species, wilderness suitability, other authorized uses, or other resources, the affected areas shall be immediately closed to the type(s) of vehicle causing the adverse effect until the adverse effects are eliminated and measures implemented to prevent recurrence (43 CFR 8341.2).

Provisions for route decommission and rehabilitation of closed or illegal routes include the following:

- OHV use is causing, or will cause, considerable adverse effects.
- A road or vehicle route poses a threat to public safety.
- Road density is adversely affecting resources.
- Closure is necessary for desired future conditions for access.
- Closure is necessary for visual resource protection.
- Closure is necessary for sensitive habitat management.

Travel and Transportation Management Implementation

The BLM uses several means to implement travel management designations. A major component of travel management is a series of well-designed maps and/or brochures that clearly portray TMA designations. Another component is the BLM sign program. Signing in the field must be sufficient to ensure that the public understands the regulations for any given area. Law enforcement and public education provide further assistance in implementation. The final step in the process is monitoring and evaluation, which may lead to adaptive management.

1. OHV Signs

- Signs are designed to notify the public of travel management designations in the field. They should be simple to understand, inexpensive, durable, and easy to install and replace.
- Signs will be standardized. OHV signs must be standardized within the BLM, especially among neighboring field offices. The message on the sign may vary according to the nature of the individual OHV designation but the size, type of substrate, layout and design should be the same. Efforts will be made to use alternative materials deemed as effective as being "vandal-proof," or made of environmentally-friendly products.
- Signs will indicate places where access roads leave public roads and enter TMAs, where appropriate. Due to the land tenure patterns within the planning area, signs may not be available at all access points. Portal signs will explain the travel management designation for the TMA.
- For areas designated as "Limited to Designated Roads," all designated roads may be identified with numbers on travel management maps, consistent with statewide road & trail signing efforts. Every effort will be made to number routes with on-the-ground signs, but land tenure and the scope of the planning area may prevent the numbering of all routes.
- Until travel management plans are completed, areas designated as "Limited to Designated Roads" will be managed as "Limited to Existing Roads." In such areas, only portal signs are necessary. Individual roads and vehicle routes need not be signed.
- For road closures and closed areas, documentation stating the rationale for the closure must be made available to the public.

2. Maps and Brochures

Maps will provide detailed information to the public regarding travel management designations. A site-specific map will be published for each TMA following completion of the travel management

plan. travel management plan decisions may eventually be reflected on 1:100,000-scale Surface Management Status maps. However, given the scope of the Surface Management Status maps and the cost and timeframe for updating such maps, the public must not rely on 1:100,000-scale maps for travel management plan decisions. Brochures for specific areas may also be published.

3. Education

Educational programs will be included in travel management implementation planning. The BFO will initiate programs for the public that emphasize responsible OHV-use, respect for the land, resources, and private property rights. Information about regulations, penalties, consequences for irresponsible behavior, and potential impacts to resources from inappropriate use will be incorporated into the outreach program.

4. Enforcement

Law Enforcement is essential for successful OHV implementation and management. All federal and state laws that apply to motor vehicle use (including the Wyoming Off-Road Recreational Vehicles Act) are subject to enforcement. The BLM may also enter into cooperative law enforcement agreements with other federal, state and local agencies.

When OHV designations (which may include closures or restrictions) are developed through RMPs, publication of the Federal Register Notice for ROD, is required and is sufficient for legal enforcement. When the BLM issues an order that closes or restricts the use of public lands, adequate public notification is required. For those orders to be legally enforceable and upheld in court the requirements found in 43 CFR Subpart 8364, Closures and Restrictions, must be followed.

5. Monitoring and Evaluation

Monitoring is an integral component of OHV management (BLM 2012a). The BLM will monitor the effectiveness and appropriateness of the OHV designations.

Items to monitor include, but are not limited to the following:

- Resource damage resulting from OHV use
- Unauthorized route development
- Effects of OHV use on wildlife
- Effects of OHV use on other recreation or resource uses
- OHV user conflicts and complaints
- Trends in the number of OHV violations and incident reports
- OHV associated private land conflicts
- Identification of maintenance needs
- Fence and barrier conditions

Other Travel and Transportation Management Elements

Authorized and Permitted Uses

Use of OHVs may be administratively authorized or permitted for non-casual activities, such as accessing range improvements, exploration for energy or minerals, and access to inholdings. Temporary excursions leaving existing vehicular routes are permitted only to accomplish necessary tasks. Necessary tasks are actions that support commercial or industrial uses of public

lands which need to be accomplished by a person or organization seeking or holding authorization from the BLM to build, maintain, or place infrastructure necessary to achieve planning goals and objectives, or exercise valid existing rights.

Necessary tasks that support commercial or industrial uses of public lands may be allowed under permit in areas managed under limited designations (motorized use limited to designated roads and trails), and should not be authorized in areas closed to motorized use, such as WSAs or in areas with seasonal limitations unless exercising valid existing rights.

Authorizations or permits that include OHV activities will address the use of OHVs as part of the authorization or permit. Authorized OHV activities require an appropriate level of NEPA environmental analysis, should be compatible with the land use plan goals, and may have use stipulations associated with the authorization or permit. Relevant NEPA documents should analyze whether any new roads would remain open to the public, open solely for administrative access, or reclaimed following completion of the original proposed action. Mitigation measures pertaining to motor vehicle use or the necessary task exemption will be included in the terms and conditions, conditions of approval, and/or stipulations.

Sometimes necessary tasks are and will be accomplished without formal written approval or in advance of receiving an authorization in accordance with Onshore Order 1. Another example is mineral activities defined as casual use (except in areas designated as Closed to OHV use) by 43 CFR 3809 – Surface Management Regulations. Cross-country or off-road vehicle travel in these cases is authorized so long as resource damage does not occur. In these cases actions proposed by the proponent leads to the issuance of a permit or authorization and may be authorized after initial contact with the field office.

It is recognized that in many cases cross-country or off-road motorized vehicle use is the most efficient tool for operators and industry to achieve BLM objectives and requirements. Livestock herding, scientific studies, habitat treatments, etc. all are examples of actions that may require cross-country or off-road motorized vehicle travel. The BLM may grant administrative use authorizations on a case-by-case basis with written approval from the authorized officer or as part of the permitted use.

Authorizations will be conditional upon consistency with Land Use and Activity level planning decisions and other BLM objectives. The project proponent is encouraged to be as detailed as possible in the application for authorization. The BLM will consider an application complete when the information provided is sufficient to facilitate impact analysis, enforcement, monitoring, and evaluation. Project proponents are encouraged to submit the waiver request in tandem with other applications, renewals, or proposals, but the agency will accept the applications at all times. Waiver applications may not be accepted for individuals that are being actively investigated for violation of an OHV rule. Waivers and authorizations may not be granted to individuals who have been convicted of an OHV violation. Additionally, individuals conducting off-road travel under an authorization must carry a copy of the authorization and any relevant stipulations and conditions.

Limited cross-country vehicle travel is allowed for the purpose of maintaining existing range improvements or animal husbandry efforts if established access routes do not exist, so long as resource damage does not occur. Travel on wet or muddy soils should be avoided to prevent rutting and erosion. In these cases the project proponent is expected to submit a request for exemption from travel management regulations.

Recreational Use to Accommodate Necessary Tasks

In areas with Limited travel designations, the public is allowed to pursue certain recreational activities up to 300 feet from designated roads and trails as long as such activity does not cause resource damage, create new roads or extend existing roads. Valid reasons for pursuing recreational activities include direct access for big game carcass retrieval or to dispersed campsites. Additionally, parking alongside a route to remove the vehicle from the traffic lane is considered a necessary task. Any motorized travel outside of these parameters or that causes resource damage is a violation of the RMP decisions and is subject to enforcement action including citation and fine.

Off-Highway Vehicle Access for Persons with Disabilities

Section 504 of the Rehabilitation Act (Public Law 93-112 as amended) requires federal land managing agencies to provide reasonable opportunities for access for persons with disabilities. Accordingly, during hunting seasons, individuals possessing a valid Wyoming Game & Fish Department "Permit for Hunters with Qualifying Disabilities" will be allowed to use an OHV to retrieve big game carcasses in areas designated as "Limited to designated" routes beyond the 300 foot travel zone without any additional authorization, provided that resource damage or the creation of new roads does not occur. *Note: Personal mobility devices (such as wheelchairs, mobility scooters, etc.) utilized for medical purposes are exempt from travel management restrictions.*

In addition, Field Managers will consider requests by persons with disabilities for authorization for cross-country travel for the purposes of gaining access to the public lands for recreational purposes. These requests will be considered on case-by-case basis. Decisions will be based on a combination of factors including need, other available opportunities, resource management considerations, and the assurance that the activity can be carried out without causing resource damage. If OHV use authorizations are granted, the above criteria will be included in the written authorization.

BLM Administrative Use

Off-road travel by BLM employees conducting official business is allowed only for necessary tasks and only if such travel does not cause resource damage or create unauthorized or unplanned roads and trails. Such travel by BLM employees must meet the same standard required of permit holders who are performing necessary tasks in conjunction with their permit or authorization. Administrative use of motor vehicles may be allowed within closed areas outside of WSAs, however, written approval from the authorizing officer must be obtained prior to off-road use in closed areas unless an emergency situation exists. Additionally, emergency operations such as firefighting will use existing roads whenever feasible.

Over-Snow Travel

Over-snow travel is restricted in closed areas and during relevant seasonal closures. However, the BLM recognizes that snowmobiles may not cause resource damage when operated off-route in an appropriate manner. Historically there have been few places within the planning area that receive sufficient snow cover (4 inches - 6 inches) for the safe and sustainable operation of snowmobiles. However, should snow cover be sufficient to prevent resource damage, snowmobiles may operate off of designated routes in areas "Limited to designated routes," provided that no seasonal restrictions or temporary closures exist and resource damage does not occur.

Temporary Closures and Restrictions

The purpose of a temporary closure and restriction is to protect public health and safety, or prevent undue or unnecessary resource degradation due to unforeseen circumstances. Where OHVs are causing or will cause considerable adverse effects upon soil, vegetation, wildlife, wildlife habitat, cultural resources, historical resources, Threatened or Endangered species, wilderness suitability, other authorized uses, or other resources, the affected areas shall be immediately closed to the type(s) of vehicle causing the adverse effect until the adverse effects are eliminated and measures implemented to prevent recurrence.

Wilderness Study Areas

OHV designations for lands in WSAs must conform to Manual 6330 - Management of Wilderness Study Areas (BLM 2012c). Cross-country travel by motor vehicle is strictly prohibited in WSAs. Signs, maps, publications, outreach and enforcement will be used to inform the public aware of motorized restrictions. Exceptions will be allowed in accordance with Manual 6330 (BLM 2012c). The 300 foot travel exception which applies to the "Limited" category does not apply in WSAs as these areas are closed entirely to motorized use. In addition, the exemption for retrieving harvested big and trophy game animals within 300 feet of an existing road or trail is not allowed in WSAs, nor is any exemption for cross-country travel for hunters with qualifying disabilities.

Known existing routes within WSAs were documented and mapped during the original wilderness inventory process (BLM 1979) and updated during this RMP revision. This route inventory data is the baseline for the travel and transportation network for the following WSAs: Fortification Creek, Gardner Mountain, and North Fork.

In WSAs, motorized and mechanized use may be permitted to continue along existing routes identified in the wilderness inventory conducted in support of Sections 603 and 202 of FLPMA. None of the WSAs within the planning area contain documented ways in the original inventory that meet exception criteria for motorized travel. Therefore, no motorized use is allowed in WSAs except as defined for valid and existing rights in Manual 6330 (BLM 2012c).

Resource Damage

While generally defined (see glossary) the determination of whether resource damage has occurred is left to the discretion of Field Managers and law enforcement personnel. Project proponents are encouraged to contact their local field offices prior to using any vehicle off of established routes, so as to ensure that they will not cause resource damage. In addition project proponents must notify the BLM in writing when and where off-road travel has occurred prior to an authorization. This may be done at the application phase, but must occur prior to final authorization.

Revised Statute 2477 Assertions

A travel management plan is not intended to provide evidence bearing on or addressing the validity of any Revised Statute 2477 assertions. Revised Statute 2477 rights are adjudicated through a separate, judicial and administrative process that is entirely independent of the BLM's planning process. Consequently, travel management planning should not take into consideration Revised Statute 2477 assertions or evidence. Travel management planning should be founded on an independently determined purpose and need that is based on resource uses and associated access to public lands and waters. At such time as a decision is made on Revised Statute 2477 assertions, the BLM will adjust its travel routes accordingly.

Route Definitions, Route Management Categories, Maintenance Levels

Road maintenance, construction, and any other related TTM is mandated by BLM Manual 9113 (BLM 1985b). BLM Manual 9113 (BLM 1985b) provides for "best management practices" to be used in evaluating, maintaining, and constructing BLM travel and transportation routes. As guided in Manual 9113 (BLM 1985b), "Bureau roads must be designed to an appropriate standard no higher than necessary to accommodate their intended functions adequately (timber hauling administrative access, public travel); and design, construction, and maintenance activities must be consistent with national policies for safety, esthetics, protection and preservation of cultural, historic, and scenic values, and accessibility for the physically handicapped."

Route Definitions

IM 2006-173 (BLM 2006d), "Implementation of the Roads and Trails Terminology Report," dated June 16, 2006, established BLM definitions for road, primitive road (which was added as a new transportation asset category), and trail, and required transportation assets to be classified as such. As part of this BLM-wide classification process, existing FAMS transportation assets were reviewed and reclassified to accurately reflect the new definitions.

- **Road:** A linear route declared a road by the owner, managed for use by low clearance vehicles having four or more wheels, and maintained for regular and continuous use.
- **Primitive Road:** A linear route managed for use by four-wheel drive or high-clearance vehicles. Primitive roads do not normally meet any BLM road design standards.
- **Trail:** A linear route managed for human-powered, stock, or OHV forms of transportation or for historical or heritage values. Trails are not generally managed for use by four-wheel drive or high clearance vehicles.

Primitive roads shall not be designated within a WSA or within lands that have been identified as having wilderness characteristics for which a land use plan has determined that wilderness characteristics are to be protected. Any linear feature located within areas that have been identified as WSAs and/or those lands outside of WSAs with wilderness characteristics will be identified in a transportation inventory as a "route." Except for nonmotorized and nonmechanized trails, these routes will not be classified as a transportation asset and will not be entered into FAMS unless one of the following conditions is met:

- Congress designates the area as Wilderness (then nonmotorized and nonmechanized trails only), or
- RMP decision is made to not protect the area for wilderness characteristics, or
- Congress releases the area from Wilderness consideration.

Route Management Categories

Route Management Categories describe the primary purposes and uses for the routes. Many routes fall under more than one management category. Much use by private landowners, grazing permittees, and the public occurs on Collector Roads and is provided under casual use; therefore, a formal use authorization is not required. Maintenance levels outline the degree of maintenance to be performed, dependent on funding levels. Maintenance of routes with limited or no public access may be the responsibility of the landowner.

Private landowner maintenance of routes on BLM-administered land will be supervised by the BLM. Route maintenance is generally prioritized, based on safety concerns and degree of use. Inadequate funding may preclude the BLM from maintaining routes at levels assigned in this travel management plan. Route Management Categories and Maintenance Levels are monitored and may be modified as needs and conditions change.

Items A through C of this list conform to BLM guidelines included in the Pocket Field Guide: Road Standards, Excerpts from BLM Manual Section 9113. The types of roads that exist on the public lands are as follows:

- **Collector Road:** These roads normally provide primary access to large blocks of public land, and connect with or are extensions of a public road system. Collector roads accommodate mixed traffic and serve many uses. They are generally capable of handling high traffic volumes. Collector roads usually require application of the highest engineering standards used by the BLM. Collector roads receive routine maintenance.
- **Local Roads:** These BLM roads normally serve a smaller area than collectors, and connect to collectors or the public road system. Local roads receive lower volumes of traffic, carry fewer traffic types, and generally serve fewer users. Low volume local roads in mountainous terrain, where speeds are reduced, may be single lane roads with turnouts, and may be maintained to a lower standard than collector roads.
- **Resource Roads:** These are normally spur roads that provide point access and may connect to local or collector roads. They carry low traffic volumes and accommodate few uses.

Maintenance Levels

Route management categories and route maintenance levels on roads, primitive roads, and trails designated Open to motorized or nonmotorized use within the BFO will be stored in a FAMS database. Guidance directs the BLM that upon approval of the RMP ROD, designated travel routes must be entered into FAMS. The FAMS data will serve as the current information on the BLM's transportation system. There are five maintenance levels assigned to a travel route ranging from low maintenance priority to high priority. The following further details the maintenance levels:

- **Level 1:** This level is assigned to roads where maintenance is limited to protecting adjacent land and resource values. These roads are no longer needed and are closed to traffic. The objective is to remove these roads from the transportation system. At a minimum, drainage and runoff patterns will be maintained as needed to protect adjacent land. Grading, brushing, or slide removal will not be performed unless roadbed drainage is being adversely affected or is causing erosion. Closure and traffic restrictive devices will be maintained.
- **Level 2:** This level is assigned to roads open seasonally or year-round and uses may include commercial, recreation, private property access, and administration purposes. Typically, these roads are passable by high clearance vehicles and are maintained, as needed, depending on funding levels. Seasonal closures or other restrictions may be needed to meet resource objectives or because of snow levels or other weather conditions. At a minimum, drainage structures will be inspected within a 3-year period and maintained as needed. Grading will be conducted as necessary to correct drainage problems. Brushing will be conducted as needed and slides may be left in place provided they do not adversely affect drainage.
- **Level 3:** This level is assigned to roads open seasonally or year-round and uses may include commercial, recreation, private property access, and administrative purposes. Typically, these roads are natural or have an aggregate surface, but may include bituminous surface roads. These roads have a defined cross section with drainage structures such as rolling dips, culverts or ditches and may normally be negotiated by passenger cars driven cautiously. User comfort and convenience are not considered a high priority. At a minimum, drainage structures will be inspected annually and maintained as needed. Grading will be conducted to provide a reasonable level of riding comfort at prudent speeds for the road conditions. Brushing will be conducted as needed to improve sight distance. Slides adversely affecting drainage will receive high priority for removal and other slides will be removed on a scheduled basis.

- **Level 4:** This level is assigned to roads open seasonally or year-round. Uses include commercial, recreation, private property access, and administrative purposes. Typically, these roads are single or double lane and have an aggregate or bituminous surface. This maintenance level provides access for passenger cars driven at prudent speeds. At a minimum, the entire roadway will be maintained at least annually, although a preventive maintenance program may be established. Major problems will be repaired as discovered.
- **Level 5:** This level is assigned to roads open seasonally or year-round that carry the highest traffic volume of the transportation system. Uses include commercial, recreation, private property access, and administrative purposes. Typically, these roads are single or double lane and have an aggregate or bituminous surface. This maintenance level provides access for passenger cars traveling at prudent speeds. The entire roadway will be maintained at least annually and a preventive maintenance program will be established. Problems will be repaired as discovered.

Routes (ways) within WSAs are not maintained other than by the passage of vehicles, with certain exceptions. Exceptions are limited to the minimum mechanical maintenance necessary under Manual 6330 (BLM 2012c).

Appendix S. Areas of Critical Environmental Concern

S.1. Proposed Areas of Critical Environmental Concern Designated by Alternative D

S.1.1. Pumpkin Buttes

SUPPORTING INFORMATION
The boundary of Pumpkin Buttes Areas of Critical Environmental Concern (ACEC) includes all portions of the Pumpkin Buttes Traditional Cultural Property that are Bureau of Land Management (BLM)-administered surface (1,731 acres). The Pumpkin Buttes are approximately 45 miles southwest of Gillette, rising approximately 800 feet above the surrounding landscape. The buttes consist of five flat topped mesas referred to as North Butte, North Middle Butte, South Middle Butte, South Butte and Indian Butte. The top of North Middle Butte is 6049 feet, which is the highest elevation in Campbell County. All of South Middle Butte and roughly one third of North Middle Butte are BLM-administered surface. The majority of the mineral estate under the buttes was reserved by the government. There is no public access to the BLM-administered surface on either butte, although, BLM purchased an administrative easement to South Middle Butte. South Middle Butte is currently used as a communication site and includes six transmission towers. There are several uranium claims on and near the buttes, with one proposed uranium mining operation on BLM-administered surface on North Middle Butte. Nearly all the fluid minerals under the buttes are currently leased. There is extensive coalbed natural gas development around the buttes, and an existing oil field within three miles. A proposed 200 turbine wind-energy development is located on fee surface within two miles of the east side of the buttes. Recent consultations with several Native American tribes revealed that the buttes have been used for many types of traditional, religious and ceremonial purposes. Numerous past indications of traditional and religious uses (stone circles, eagle traps, cairns, etc.) remain on most of the buttes. Numerous lithic scatters and prehistoric camps are recorded on and near the buttes, indicating occupational use dating back to at least 10,000 years. There are stone circle sites on top of and around the base of the buttes. Although most archeologists interpret stone circles to be the remains of tepee locations, many tribes indicate that they represent ceremonial use and are more accurately interpreted as effigies. Numerous cairns have also been recorded on and around the buttes. Tribes have indicated to the BLM that cairns can mark the location of ceremonial areas such as fasting locations or may represent burials. The buttes contain many eroded cliff faces with deep crevasses, which were often utilized as burial locations. One eagle trap location is documented on top of one of the buttes. The tribes indicated to BLM that eagle traps are significant religious and cultural sites. In 2007 the BLM determined in consultation with fifteen tribes that the Pumpkin Buttes in their entirety is a traditional cultural property and that the area has an ongoing connection to traditional beliefs and practices of several Native American tribes. During the consultation process, some tribes expressed an interest in using the buttes for ceremonial or educational purposes. The Pumpkin Buttes are also a prominent landmark associated with several historic events. All of the explorers of the Powder River Basin in the early and mid 19th century mention the buttes in their journals. The name "Pumpkin Buttes" was credited to the unique geographic features by Jim Bridger in the 1850s They are also often mentioned as a landmark in several emigrant diaries from travelers on the Bozeman Trail in the 1860s The buttes had a secondary role in the Red Cloud War and Great Sioux War, documented as a lookout for the U.S. Army and Native American tribes. There are active golden eagle and prairie falcon nests on top of the buttes. Wildlife common to the area include mule deer, pronghorn, Greater Sage-Grouse, coyote, bobcat, raptors and numerous song birds. Bald eagles frequent the buttes in the winter. There are no Threatened or Endangered species on the buttes. Sensitive species in the area that may occur include: Greater Sage-Grouse, loggerhead shrike, Brewer's sparrow, sage sparrow. The site meets the relevance criteria since it contains several a rare and sensitive archeological resources, and is a significant religious and cultural resource important to several Native American tribes. The site meets the importance criteria since it retains has qualities which give it special worth and distinctiveness. The area also has qualities that make it fragile, sensitive, irreplaceable and vulnerable to adverse change. The area also meets the importance criteria because it warrants protection in order to carry out the mandates of Federal Land Policy and Management Act.

Current and proposed management is insufficient to protect the relevance and importance criteria. In compliance with the National Historic Preservation Act, any impacts to the site as a result of a federal undertaking must be considered and adverse effects must either be avoided or mitigated. If Alternative D (specifically Cultural 005, 006, 007) is selected, the creation of a Cultural Resource Project Plan, surface disturbance restrictions, and application of no surface occupancy (NSO) and controlled surface use stipulations to fluid minerals leases will result in a degree of protection for the area. The existence of fluid mineral leases under the majority of the area, numerous uranium claims and proposed mining operations, nearby wind-energy development and the existence of multiple communications towers on the buttes creates a difficult management condition in which it is exceedingly difficult to effectively balance resource concerns. Additionally, there are intangible significant aspects of the area, such as cultural and religious significance to the tribes that standard surface occupancy management decisions cannot adequately address. Since the area may be an important part of several tribes' ongoing cultural identity, special management is necessitated. Federal agencies are mandated by the American Indian Religious Freedom Act to provide access for tribes to sites with cultural significance on federal surface.

Development of existing minerals leases, locatable minerals development, wind-energy projects and the existence of communications towers on the Pumpkin Buttes directly conflict with the legal rights of Native American tribes to utilize the area for traditional cultural rights and practices. Because of these factors, the site should be designated as an ACEC.

ACEC OBJECTIVE(S) DECISIONS

Objective Statement: Management of the Pumpkin Buttes ACEC is consistent with Native American religious practices. The Pumpkin Buttes are preserved and protected as a nationally significant cultural resource.

MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Mineral Resources:

The area will be recommended for withdrawal from mineral entry and closed to disposal of mineral materials. An NSO on fluid leasable minerals will be applied to all lands within the ACEC.

Fire and Fuels Management:

Fire suppression activity should avoid the use of heavy equipment unless there is a direct and measurable risk to life or property.

Biological Resources:

Do not allow non-native plant species for initial reclamation activities.

Heritage and Visual Resources:

Establish tribal access and allow for traditional cultural rights and practices.

Develop a Cultural Resource Project Plan (CRPP) in cooperation with stakeholders.

Manage as Visual Resource Management Class II.

Land Resources:

ACEC will be managed as a rights-of-way exclusion area that is also closed to renewable energy development.

Travel is Limited to designated routes.

New surface-disturbing activities will be prohibited in the ACEC.

Special Designations:

No other Special Designations exist within the proposed boundaries of the ACEC.

IMPLEMENTATION DECISIONS
Implementation Decisions: (e.g., The land use plan decision may be to designate motorized travel areas while the supporting implementation decisions would address specific route designations) *Marketing:* The area will not be marketed for recreational use. There is no public access to the ACEC. *Monitoring:* *Management:* A management plan will be created for the ACEC which includes input from Native American tribes and all other stakeholders. *Administrative:* *Travel Management:* The area will be managed as Limited to designated routes. Designated routes will be primarily for provision of access to communication sites and for administrative use. *Special Recreation Permits:* Commercial guiding will not be allowed. *Agreements:* *Partners:* *Other administration:*

S.1.2. Welch Ranch

SUPPORTING INFORMATION
The Welch Management Area is a 1,748-acre parcel, located approximately 10 miles north of Sheridan, Wyoming. The Welch area is accessible from Sheridan via Wyoming State Highway 338 (Decker Road). Two developed parking areas exist at the junction of Highway 338 and the Tongue River with directional signs identifying the area. Several unimproved primitive roads totaling 6.1 miles facilitate administrative use and livestock operations on the property both from Highway 338 and from the Ash Creek Road located just north of the property. The Welch Ranch was acquired in 2004 as part of a land exchange (BLM 2005f). As a new acquisition, the Bureau of Land Management (BLM) must evaluate the area as a potential Area of Critical Environmental Concern (ACEC). The Welch area is located in the Powder River Basin, a part of the Northern Great Plains, which includes most of northeastern Wyoming and a portion of southeastern Montana. The Welch property occupies a portion of the Tongue River valley floor and the adjacent dissected uplands between Ash Creek and Hidden Water Creek. At least two homesteads were present on the property, including the Tryor homestead and the Evans homestead, which included a post office. There is also evidence of prehistoric use, including lithic scatters and quarries. Approximately 1.5 miles of the Tongue River runs through the Welch Ranch. A coal seam fire exists on a ridge in the southwestern corner of the parcel. The Big Horn Mountains are visible from the majority of the Welch Ranch. The coal fire origin is not certain, but historical records indicate that it began or reached the Welch Ranch boundary between 1911 and 1940, and is related to an abandoned coal mine fire at the Acme mine. While the origin is unclear, the fire is now considered to be part of the natural process. The Office of Surface Mining has expressed concerns regarding human health and safety in relation to the coal fire and has suggested that special management may be necessary to prevent unsafe exposure to this hazard. The coal fire on the north side of the river is an important resource because it represents a potential threat to health and safety, influences plant and animal distribution and form, and represents historical mining operations (BLM 2003b). To date no known injuries have resulted from public interaction with the fire vents. The riparian corridor is important for migratory birds and boasts excellent habitat for mule deer and other big game. The Tongue River is a free-flowing prairie river with easy public access from a major population center in Wyoming as well as a red ribbon fishery identified as having regional importance. The State of Wyoming's 305(b) Report for 2012 lists water-bodies with impairments to water quality in the Tongue River Basin for temperature, turbidity and fecal coliform (Wyoming DEQ 2012). Without special designation and management, there is a strong possibility that visitation will degrade the importance and relevance criteria. Increased public awareness of riparian health will assist in improving the habitat and subsequently increasing the species diversity and numbers of birds to the point that the area will be acknowledged as an Important Bird Area. The Welch Ranch offers nonmotorized dispersed recreation including camping, mountain bicycling, freshwater fishing, hiking, small and big game hunting, upland bird hunting, picnicking, wildlife viewing, bird watching and float trips. Motorized use is prohibited within the management area. Prohibitions within the developed parking area include overnight camping, open fires and discharge or use of fireworks, firearms, or weapons. The area meets the relevance criteria for significant scenic values, fish and wildlife resources, and presence of a natural hazard (coal fire). The Welch Ranch meets the importance criteria in that it has more than locally significant qualities which give it special worth and which warrant special management for safety or public welfare. Welch constitutes one of very few riparian areas managed by the BLM and one of the few areas in Sheridan County with public river access for fishing and boating. Prairie riparian habitats represent less than 1% of the planning area. The combination of the rarity of the habitat type, the accessibility of the location in close proximity to a population center, and the high recreational use underscore the need for special management at the Welch Ranch. The ACEC boundary in the proposed RMP encompasses 1,116 acres and include BLM-administered surface in T57N, R84W Sections 1, 2 and a portion of Section 3. This boundary includes the entirety of the riparian area and the coal seam fire. Special management attention is necessary to protect human health and safety and address documented issues within the river corridor and riparian area and an ACEC should be designated.
ACEC OBJECTIVE(S) DECISIONS
Objective Statement: The Welch Ranch ACEC will be sustained or enhanced for nonmotorized and wildlife based recreational opportunities, preservation of outstanding scenic values and for the safety of visitors.
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Physical Resources:

Prohibit surface disturbance resulting in impacts to physical resources (soil, water resources) unless those activities can be demonstrated to protect the relevance and importance criteria.

Mineral Resources:

The area will be recommended for withdrawal from mineral entry and closed to disposal of mineral materials. The area is closed to leasing of fluid minerals. Note: A portion of the fluid leasable minerals are not administered by the BLM.

Fire and Fuels Management:

Fire suppression activity should avoid the use of heavy equipment unless there is a direct and measurable risk to life or property.

Biological Resources:

Prohibit the use of non-native plant species for all reclamation activities.

Prohibit the introduction of desirable non-native wildlife species.

Heritage and Visual Resources:

Manage as Visual Resource Management Class II.

Land Resources:

This ACEC will be managed as a right-of-way (ROW) exclusion area that is also closed to renewable energy development. The burying of low voltage powerlines is preferred in ROW that have been authorized but not developed.

Travel is limited to administrative use on designated routes.

The area will be managed as a Special Recreation Management Area (Appendix T (p. 2543)).

Livestock grazing will be managed in concert with other resource values under a site-specific allotment management plan.

Special Designations:

No other Special Designations (WSA, WSR, BCB) exist within the proposed boundaries of the ACEC.

Socioeconomic Resources:

Mitigation of coalbed fires at Welch Ranch will be in concert with other resource values and should result in the least disruptive and surface disturbance possible.

IMPLEMENTATION DECISIONS
Implementation Decisions: (e.g., The land use plan decision may be to designate motorized travel areas while the supporting implementation decisions would address specific route designations) *Marketing:* Provide maps and information at the field office. Directional signage present from Highway 339. Develop interpretive signs at trailhead/parking area on general location, history, geology, and wildlife resources. Provide stewardship information to help preserve the special landscape character. Make available for outreach programs such as Conservation and Outdoor Recreation Education, Take It Outside, International Migratory Bird Day, National Public Land Day, etc. *Monitoring:* Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows. Riparian and upland range monitoring began in 2010. A green-line based riparian monitoring regime will be used to document changes in the riparian system through time. Upland transects were also established in 2010 to monitor changes in native v. non-native grass cover as well as rangeland health and will be monitored on at least a biennial basis. Riparian bird surveys (4 times per year) began in 2009 and will continue on at least a biennial basis. *Management:* Signs present at key access points. Additional signage may be necessary to apprise public of coal seam fire hazards. Develop trailheads for foot, horse and bicycle travel. Increase river corridor accessibility for boaters and anglers. *Administrative:* *Travel Management:* The area will be managed as Limited to designated routes, with very few routes designated. Designated routes will be primarily to provide egress for administrative use. *Special Recreation Permits:* Allowed with general stipulations. *Agreements:* Maintain cooperative agreements with Wyoming Department of Game and Fish and Wyoming Department of Environmental Quality. *Partners:* University of Wyoming, Sheridan Community Land Trust, Sheridan Public Land User Committee, Wyoming State Land Board and Wyoming Department of Game and Fish. *Other administration:* Closed to recreational target shooting. The parking lots and trailheads are closed to camping. Dispersed camping is otherwise allowed.

S.2. Proposed Areas of Environmental Concern not Designated by Alternative D

S.2.1. Burnt Hollow

Background:
Burnt Hollow encompasses about 17,280 acres of public land 20 miles north of Gillette, Wyoming. The land was acquired by the Bureau of Land Management (BLM) through a land exchange completed in 2002 (BLM 2005f). The area is composed of gently rolling sagebrush/grasslands, scoria buttes and clayey escarpments. There are numerous cottonwood ephemeral drainages, with juniper and ponderosa pine covered slopes. Several areas contain steep terrain and unstable soils.

The area meets relevance criteria for scenic value, and natural hazards due to steep erosive soils and flooding potential. Increased erosion could subsequently increase the potential for flooding at lower elevations. The area meets the importance criteria for local significant qualities (recreational access); warrants protection to satisfy national priority concerns; and public or management concerns about safety and property.

The varied topography and diversity of vegetation communities provide habitat for numerous wildlife species including trophy class mule deer (*Odocoileus hemionus*). A few of the ephemeral drainages support ecologically important cottonwood (*Populus* spp.) riparian communities. The lands are presently used for livestock grazing and wildlife habitat; mineral development is limited to a few abandoned drill holes.

Cultural resources are also present in the area. Twenty-three cultural properties have been recorded in the vicinity. These sites include: 12 lithic scatters, 10 campsites or occupations, and one historic road, now the roadbed of Highway 59, and the Texas Trail. One occupation site has been determined Eligible to the National Register of Historic Places; another is of unknown eligibility. Other prehistoric and historic era sites are known to exist within Burnt Hollow, but have not yet been recorded.

Most importantly, the area is one of the largest blocks of contiguous public land in Campbell County, and one of the few parcels that are not highly developed or heavily roaded. The area is easily accessible to Gillette, approximately 20 miles to the south on Wyoming Highway 59.

Justification:
The area meets the relevance criteria for significant scenic value and presence of a natural hazard due to steep erosive soils and flooding potential. Burnt Hollow meets the importance criteria in that it has more than locally significant qualities (recreational access) which give it special worth and public or management concerns about safety and property.

Such a large block of accessible public land is rare in the Powder River Basin (PRB). The size and naturalness of Burnt Hollow accommodate primitive and unconfined nonmotorized recreational opportunities, discussed in Appendix T (p. 2543). The designation of a Special Recreation Management Area (SRMA) and travel management planning, including route designations, would be sufficient to prevent undue and unnecessary degradation from visitor use in the management area. There is no potential for commercial forestry actions in the area. If Alternative D is selected, the designation of Visual Resource Management (VRM) Class II would protect scenic values. Surface disturbance restrictions and closing the area to fluid minerals leases would result in adequate protection from mineral or Right-of-Way (ROW) development and associated surface disturbance which would reduce the risk of flooding. Due to the intermittent potential for floods, signs at key access points warning visitors of flood potential should be sufficient to protect the relevant and importance criteria and human health and safety.

S.2.2. Cantonment Reno

Background:
The proposed Area of Critical Environmental Concern (ACEC) is the BLM-administered surface around Cantonment Reno (523 acres). Cantonment Reno was constructed as a military supply fort on the Bozeman Trail in October 1876. The fort measured 475 feet by 520 feet and contained quarters, kitchens, mess houses, a hospital, and storage buildings. It could hold more than 350 soldiers and had specialized facilities for cavalry, including three large stables. Most buildings were hastily constructed dugouts built with cottonwood logs and sod roofs. It was used as a supply depot for military campaigns, primarily against the Northern Cheyenne during the winter of 1876-1877. Due to the poor condition of the buildings and a lack of wood, the U.S. Army abandoned the cantonment in 1878.

The site retains well defined features (foundations), but no buildings remain standing. The site contains numerous buried artifacts and is noteworthy for the high amount of intact archeological information it contains. Hundreds of documents relating to the fort are on file at the National Archives, presenting numerous opportunities to answer research questions through site excavation. Although there is no public access, unauthorized excavation and collection have occurred at the site. The location is on a floodplain of the Powder River and might soon be exposed to erosion from an encroaching oxbow bend. The fluid minerals under the site have been leased, but a "no surface occupancy" stipulation exists for the entirety of the proposed ACEC.

Justification:
Cantonment Reno is the only military fort from the period of the Great Sioux Wars on BLM-administered surface in the nation. The site meets the relevance criteria since it is a rare and sensitive archeological resource. The site also meets the importance criteria since it is directly associated with nationally significant historic events (the Great Sioux War), has qualities which give it significant special worth and distinctiveness, and has qualities that make it fragile and vulnerable to adverse change.

Proposed management is sufficient to protect the relevance and importance criteria. In compliance with the National Historic Preservation Act, any impacts to the site as a result of a federal undertaking must be considered and adverse effects must either be avoided or mitigated. If Alternative D (specifically Cultural 005, 006, and 007) is selected, the creation of a Cultural Resource Project Plan, surface disturbance restrictions, and application of no surface occupancy (NSO) and controlled surface use (CSU) stipulations to fluid minerals leases will result in adequate protection. If any or all these specific management actions are not selected, the site should be considered for designation as an ACEC.

S.2.3. Dry Creek Petrified Tree

Background:
The Dry Creek Petrified Tree area consists of a 2,567 acre parcel of BLM-administered surface and an environmental education site, located about 8 miles east of Buffalo, Wyoming. A small portion of the Dry Creek Petrified Tree area, approximately 40 acres, features petrified specimens of early Eocene Metasequoia trees. A 0.8 mile interpretive loop trail winds its way past remnants of petrified trees. The area has public access, interpretive trail, outhouse, and a picnic shelter and tables. The area is popular with tourists, local schools, and hunters alike.

The area meets relevance criteria for unique geologic feature, and the importance criteria for local significance (used as an educational and tourist attraction). Currently, a 0.5-mile NSO buffer of the site prevents fluid mineral development; there has been no recorded interest expressed in mineral development within this buffer.

Justification:
The 40 acres containing the interpretive trail and developments remain closed to livestock grazing and motorized use in all alternatives. In Alternative D, the designation of an SRMA would include a recommendation for withdrawal from mineral entry, a designation of VRM Class II, closure to fluid mineral leasing, and restrictions on surface disturbance. There is no potential for commercial forestry actions in the area. The area is closed to collection of petrified wood. If Alternative D is selected, adequate protection will be provided for the relevant and important criteria at the site and Dry Creek Petrified Tree would not be designated as an ACEC.

S.2.4. Fortification Creek Elk Area

The Fortification Creek evaluation area encompasses the crucial seasonal ranges occupied by a locally and regionally important geographically isolated elk herd (71,755 acres). The BLM-administered surface totals 32,602 acres and the mineral estate is 61,481 acres. The area is composed of rough prairie break topography bisected by several drainages. Typical vegetation is sagebrush/grassland intermixed with juniper. Elk historically occurred in the area but were extirpated in the late 1800s. Today, a herd of approximately 200 elk resides yearlong in the area, as a result of reintroductions from Yellowstone National Park in the 1950s. The elk herd and their habitat is threatened by encroaching coalbed natural gas (CBNG) development. The Fortification Creek area also contains a Wilderness Study Area (WSA), scenic values, and steep slopes with highly erodible soils.

BLM determined in the PRB Final Environmental Impact Statement (BLM 2003c, Appendix R) that the Fortification Creek area meets relevance criteria for scenic value and a wildlife resource. It also meets the importance criteria for local significant qualities (wilderness characteristics), has circumstances that make it fragile, and unique (plains inhabiting elk herd, and minimal impacts from man), and has been recognized as warranting protection to satisfy national priority concerns.

Justification:
A Fortification Creek RMP Amendment was signed in 2011 (BLM 2011c) and decisions from this document will be carried forward in the current RMP revision. Impacts to the relevance criteria are mitigated under soil and wildlife action alternatives (WL-4016 through WL-4024) proposed for elk crucial winter range and calving areas, including Fortification Creek. The wilderness characteristics in the Fortification Creek evaluation area are limited to the WSA. WSA management is sufficient to protect this importance criteria. The Fortification Creek area would be managed under VRM Class III objectives (VRM-5007), offering moderate protection of scenic values while accommodating development of valid existing rights.

S.2.5. Hole-in-the-Wall

Background:
The proposed ACEC includes 11,952 acres of BLM-administered surface around the Hole-in-the-Wall and the Red Wall in southern Johnson County. The Hole-in-the-Wall is approximately 40 miles southwest of Kaycee, Wyoming. It is a colorful and scenic red sandstone escarpment that is rich in legend of outlaw activity from the late 1800s, most notably Butch Cassidy and the Wild Bunch Gang. The "hole" is a gap in the Red Wall that, legend has it, was used by outlaws to move horses and cattle through. The area is primitive in nature, with no visitor services.

Justification:
Hole-in-the-Wall meets the relevance criteria for significant historical, cultural or scenic value. The site also meets the importance criteria for having more than locally significant qualities which give it special worth and distinctiveness, and has qualities that make it unique and the site warrants protection to meet national priority concerns. The BLM has not identified or documented any historic sites on BLM-administered surface. Many of the historic features are located on private lands and several key artifacts have been removed and placed in regional museums. However, the area remains a popular destination for travelers from outside the region and for commercial tours due to the recognizable name, notoriety, and relevance in western lore.

The most difficult aspects of management at Hole-in-the-Wall are related to visitor and travel management. The designation of a SRMA and route designations would be sufficient to prevent undue and unnecessary degradation from visitor use in the management area. If Alternative D is selected, the designation of VRM Class II, surface disturbance restrictions, and application of CSU stipulations to fluid minerals leases would result in adequate protection from mineral development. There is little potential for forestry actions. There is potential for commercial wind energy in the Red Wall area which would threaten the important scenic values. Alternative D proposes to exclude renewable energy development within the southern Big Horn Mountains including the Hole-in-the-Wall area, which would be sufficient to protect the relevant and importance criteria.

S.2.6. Sagebrush Ecosystems

Background:
The Notice of Intent for BLM's National Greater Sage-Grouse Planning Strategy invited the public to nominate or recommend areas on public lands for Greater Sage-Grouse and their habitat to be considered as ACECs. Through the scoping process, numerous nominations were presented, including a nomination for all Priority Habitat to be included.

Greater Sage-Grouse are a management indicator species for sagebrush ecosystem health, meaning that they are dependent upon sagebrush ecosystems at a landscape scale for their survival and managing Greater Sage-Grouse habitat would conserve other sagebrush dependent species. Greater Sage-Grouse populations have the greatest chance of persisting when landscapes are dominated by sagebrush and natural or human disturbances are minimal (Aldridge et al. 2008; Knick and Hanser 2011; Wisdom et al. 2011).

The Buffalo Field Office (BFO) identified for ACEC consideration all public lands within four miles of Greater Sage-Grouse leks (occupied or undetermined) or winter concentration areas. Management within four miles of crucial habitat features is consistent with the National Technical Team recommendations (Taylor et al. 2012) for Greater Sage-Grouse conservation. Greater Sage-Grouse Priority Habitat was considered but eliminated from detailed analysis as the *Viability Analysis for Conservation of Sage-Grouse Populations: Buffalo Field Office, Wyoming* (Taylor et al. 2012) concluded that the northeastern Wyoming Core Population Area may not be sufficient to conserve long-term Greater Sage-Grouse population viability.

A sagebrush ecosystem ACEC meets relevance characteristics for conserving wildlife resource values and natural systems. Sagebrush ecosystems provide essential habitat that support several BLM special status species including the Greater Sage-Grouse, an Endangered Species Act Candidate species. Additional BLM sensitive species dependent upon sagebrush ecosystems, and present within the planning area, include: Brewer's sparrow, sage sparrow, and sage thrasher. Sagebrush ecosystems are terrestrial plant communities that support multiple resources (soil, water, native vegetation, biodiversity, rare and sensitive species, etc.) and land uses (recreation, livestock grazing, etc.) for which BLM is responsible for sustainable management.

A sagebrush ecosystem ACEC meets importance characteristics for protecting a natural system and for meeting national priorities. Sagebrush ecosystems are fragile and sensitive systems that provide essential habitat for several special status or rare species. Sagebrush ecosystems and the rare and sensitive species that they support are vulnerable to adverse change. Sagebrush ecosystems have been fragmented in the planning area by energy development, particularly CBNG. Greater Sage-Grouse conservation is a national priority, and the proposed ACEC has been

recognized as appropriate to maintaining sustainable Greater Sage-Grouse populations. The PRB provides important genetic linkage between population strong holds in Montana (Management Zone I) and the Wyoming basins (Management Zone II).

Justification:
Alternative D would implement the State of Wyoming's Greater Sage-Grouse Core Population Area Strategy (Wyoming Executive Order (EO) 2011–05). The BLM approach to Greater Sage-Grouse conservation in Wyoming is representative of the proactive planning and implementation of science-based conservation measures for long-term conservation of Greater Sage-Grouse and their habitats in Wyoming. Priority Habitat in Wyoming represent 15 million acres of Greater Sage-Grouse habitats and approximately half those surface acres are on BLM public lands and approximately 10 million acres of Wyoming Priority Habitat are federal mineral estate. The balanced management of BLM public lands and resources, including habitat for conservation of Greater Sage-Grouse and other resource uses represents the combined efforts of the State of Wyoming, the BLM, U.S. Forest Service (USFS), Natural Resources Conservation Service (NRCS), U.S. Fish and Wildlife Service (USFWS), and many other important local stakeholders and local governments to support multiple-use objectives and management of Greater Sage-Grouse within Wyoming.

Wyoming's Core Population Areas support approximately 80 percent of the statewide Greater Sage-Grouse population. The conservation strategy limits disturbance density and intensity within the Core Population Area. Management actions from various resources, including soil, water, vegetation and wildlife resources also conserve Greater Sage-Grouse habitat by limiting disturbance on BLM surface and mineral estate. Surface disturbance from all regulated activities is limited to no more than 5 percent of the sagebrush habitat and mineral activity is limited to one disturbance location per 640 acres. There is a standardized calculation (Disturbance Density Calculation Tool) for estimating the area of disturbance. Management actions also address: surface occupancy, disruptive activities, seasonal use, transportation, transmission lines, noise, vegetation treatments, monitoring, and reclamation.

Greater Sage-Grouse and the sagebrush ecosystem upon which they depend would be adequately conserved across the State of Wyoming under Alternative D. If any or all the specific management actions within the Wyoming Core Population Area Strategy are not selected, the sagebrush ecosystem should be considered for designation as an ACEC.

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Appendix T. Recreation Management Areas

Special Recreation Management Areas

Special Recreation Management Areas (SRMAs) are administrative units where a commitment has been made to prioritize recreation by managing for specific recreation opportunities and settings on a sustained or enhanced, long-term basis. For each SRMA the Bureau of Land Management (BLM) Buffalo Field Office (BFO) has identified supporting information, established objective decisions, described recreation setting characteristics (RSCs), identified management actions and allowable use decisions and, as necessary, identified implementation decisions.

Land use plan level recreation and visitor services objective decisions define intended activities and specific recreation opportunities to be offered. Objectives describe the intended recreation activities, experiences and benefits derived from those experiences. SRMAs may be subdivided into recreation management zones with discrete objectives.

SRMAs are managed:

(1) For their unique value, importance, and/or distinctiveness, especially as compared to other areas used for recreation.

(2) To protect and enhance a targeted set of activities, experiences, benefits, and desired recreation setting characteristics.

(3) As the predominant land use plan focus.

(4) To protect specific recreation opportunities and RSCs on a long-term basis.

T.1. Burnt Hollow Management Area

Supporting Information and Rationale

The Burnt Hollow SRMA is necessary to accommodate national visitor demand for semi-primitive nonmotorized recreational opportunities in semiarid sagebrush steppe ecoregions; this demand has been identified by local organizations, community involvement workshops, and through visitor use data. Burnt Hollow is one of the largest contiguous parcels of BLM-administered land with public access in northeastern Wyoming. The area has abundant prairie wildlife, a nearly pristine Powder River Basin viewshed, and a high probability for solitude. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand.

BURNT HOLLOW SPECIAL RECREATION MANAGEMENT AREA (SRMA) OBJECTIVES & DECISIONS
Objective Statement: Within the Burnt Hollow SRMA, by the year 2016 and thereafter, participants in recreation assessments will report an average 4.0 realization of the targeted experiences and benefits (4.0 on a probability scale, where 1.0 equals not realized and 5.0 equals totally realized) listed below. The Burnt Hollow SRMA will offer opportunities for nonmotorized recreationists to engage in horseback riding, hiking, hunting, mountain biking, environmental education, and nature viewing. Within the management area, the existing natural and physical character of the landscape will be modified only by primitive trail developments.

Activities: Hunting, horseback riding, hiking, mountain biking, environmental education, camping, backpacking; user conflicts between horseback riding and mountain biking opportunities would be mitigated through travel management allocations on designated trails if demand increases and recreation assessments indicate the necessity to separate conflicting uses.

Experiences: Developing skills and abilities, testing endurance, enjoying having access to hands-on environmental learning, enjoying having access to close-to-home outdoor amenities, savoring the total sensory experience of a landscape.

Benefits: Greater freedom from urban living, improved understanding of this community's dependence and impact on public lands, greater retention of distinctive natural landscape features, improved physical fitness/better health maintenance.

RECREATION SETTING CHARACTERISTIC (RSC) DESCRIPTIONS

Physical Characteristics: Within a 0.5 mile of paved/primary roads and highways. The character of the natural landscape within the Highway 59 viewshed is partially maintained, with infrastructure and several ranch facilities visible. In the interior of the Burnt Hollow Management Area (BHMA), the character of the natural landscape is retained with few modifications contrasting (fences, two-tracks, etc.). Desired future conditions will include maintained and marked trails, simple trailhead developments and basic toilets.

Social Characteristics: From 2006 to 2010, the average annual estimated visitation was 729 visits and 1116 visitor days. During the peak use season (Sept. through Nov.) contacts are characterized by 3-6 encounters off travel routes and 7-15 encounters per day on travel routes. Outside of peak season, contacts are rare. Most groups consist of less than 3 people. Small areas of terrain alteration are present near major roads. The sounds of other people are rarely heard once out of the Highway 59 viewshed.

Operational Characteristics: Foot and horse travel and mechanized use (mountain bikes) are allowed; all public use must be nonmotorized. Basic maps provided on trailhead kiosks, staff infrequently present to provide onsite assistance. Some regulatory and ethics signing is present in parking lots. Moderate use restrictions apply at trailheads and staging areas.

MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Recreation and Visitor Services Program: Standard 14-day camping limit applies; currently not eligible for Federal Lands Recreation Enhancement Act but may be evaluated if future investments in visitor services meet eligibility requirements. Recreational target shooting is prohibited within developed recreation sites. Dispersed camping is allowed outside of the developed parking lots.

Oil & Gas Leasing/Minerals: Closed to leasing. Recommended for withdrawal from mineral entry. Salable mineral development for administrative use only.

VRM: Class II

Renewable Energy: Renewable energy exclusion area

Lands and Realty: ROW exclusion area

Travel Management: The area will be managed as limited to designated routes, with very few routes designated for administrative motorized use only. Identify routes to close and reclaim. Modify appropriate routes into nonmotorized trails. Designated routes will be primarily for provision of access to inholdings within BHMA and to provide egress for administrative use.

Special Recreation Permits (SRPs): SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Recreation area management plan will include criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate.

IMPLEMENTATION DECISIONS

Marketing: Provide maps and information at the field office. Directional signage present from both Highway 59 and Cow Creek Road. Develop interpretive signs at trailhead/parking area on general location, history, geology, and wildlife resources. Provide stewardship information to help preserve the special landscape character. Make available for outreach programs such as Conservation and Outdoor Recreation Education, Take It Outside, National Public Lands Day, etc.

Monitoring: Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows.

Management: Signs present at key access points; additional informational signs present along trails.

Administrative:

Agreements: Establish cooperative agreements with Wyoming State Land Board and Wyoming Department of Game and Fish.

Partners: Burnt Hollow Coordinated Resource Management Working Group. Pursue partnerships with Campbell County School Districts and Gillette College to establish an outdoor classroom.

COW CREEK BREAKS RECREATION MANAGEMENT ZONE (RMZ)

Outcome Objective

The Cow Creek Breaks RMZ of the Burnt Hollow Special Recreation Management Area (SRMA) will be sustained or enhanced for visitors to engage in hiking, horseback riding, and hunting (fall) so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in Back Country and Middle Country settings.

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits
• Horse riding/packing • Hiking/backpacking • Mountain Biking • Hunting (fall season) • Nature Viewing	• Enjoying the sensory experience of a natural landscape • Enjoying ability to frequently participate in desired activities in preferred settings • Testing endurance • Being isolated and independent • Enjoying exploring on my own or in small groups • Enjoying nature • Feeling good about solitude • Developing skills and abilities • Escaping everyday responsibilities	Personal: • Enhanced awareness and understanding of nature • Closer relationship with the natural world • Improved opportunity to view wildlife close-up • Improved mental health • Improved physical health • Greater appreciation of the outdoor environment Community/Social: • Feeling good about how natural resources and facilities are being managed Environmental: • Greater retention of distinctive natural landscape features • Increased sense of stewardship for the resource Economic: • Enhanced ability for visitors and resident to find areas providing desired recreation experiences and benefits • Enhanced ability for visitors to find areas providing wanted recreation experiences and benefits • Greater protection of fish, wildlife, and plant habitat from growth, development, and public use impacts

DESIRED FUTURE RECREATION SETTING CHARACTER

Physical	Social	Operational
Remoteness: On or near mechanized routes but at least one mile from improved roads, though they may be visible. *Naturalness:* Natural setting may have modifications that would be noticed but not draw the attention of an observer wandering through the area. *Facilities:* Developed trails made mostly of native materials. Structures are rare and isolated.	*Contacts With Others:* Average encounters per day during peak hunting use season (September - November) should not exceed 5 encounters per day at staging areas, and 3 encounters per day on travel routes. *Group Size:* Group sizes are expected to remain small (less than 3 people per group). *Evidence of use:* Areas of alteration uncommon. Little surface vegetation wear observed. Sounds of people infrequent.	*Mechanized Use:* Nonmotorized, mechanized use is allowed on trails. Should conflicts arise between mechanized use and other nonmotorized recreationists, the recreation area management plan will be adapted via a public comment period. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained. Continue to enhance the availability of dependable non-potable water sources for recreationists.
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Consider the use of a Memorandum of Understanding or other cooperative agreement between the Bureau of Land Management (BLM) and pertinent partners to maintain and enhance the area.
Monitoring (and Evaluation)	• Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies. • Monitor recreation setting condition through onsite patrols during the high use season (August-November).
Interdisciplinary Support Actions	Visual Resource Management Class II; closed to public motorized use.

BURNT HOLLOW FRONT COUNTRY RECREATION MANAGEMENT ZONE (RMZ)

Outcome Objective

The Burnt Hollow Front Country RMZ will be sustained or enhanced for individuals or small groups of nonmotorized recreationists, to engage in nature and wildlife viewing, horseback riding, hiking, hunting and mountain biking. The Front Country RMZ will be promoted for environmental education opportunities. The Front Country RMZ of the Burnt Hollow Special Recreation Management Area (SRMA) will be sustained or enhanced for visitors to engage in hiking, hunting (fall), mountain biking and horseback riding, so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in these Front Country and Middle Country settings.

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits

• Horse riding/packing • Hiking/backpacking • Mountain biking • Nature Viewing • Environmental Education • Hunting	• Enjoying the sensory experience of a natural landscape • Enjoying nature • Developing skills and abilities • Enjoying learning outdoor social skills	Personal: • Enjoying easy access to natural landscapes • Improved mental health • Improved physical health Community/Social: • More informed citizenry about where to go for different kinds of recreation experiences and benefits Environmental: • Greater retention of distinctive natural landscape features • Increased sense of stewardship for the resource Economic: • Enhanced ability for visitors and resident to find areas providing desired recreation experiences and benefits

DESIRED FUTURE RECREATION SETTING CHARACTER		
Physical	Social	Operational
Remoteness: Within one mile of paved/primary roads and highways. *Naturalness:* Character of the natural landscape considerably modified. *Facilities:* Rustic facilities such as basic toilets, kiosks and interpretive displays.	*Contacts With Others:* Contact with others unlikely outside of peak season, except for cars passing on highway. During peak season, 3-6 encounters in parking lots are possible. *Group Size:* Group sizes are expected to be between 2-6 people per group. *Evidence of use:* Small areas of alteration prevalent. Surface vegetation gone with compacted soils. Sounds of people regularly heard.	*Mechanized Use:* Nonmotorized, mechanized use is allowed on trails. Should conflicts arise between mechanized use and other nonmotorized recreationists, the recreation area management plan will be adapted via a public comment period. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained. Continue to enhance the availability of dependable non-potable water sources for recreationists.
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Consider the use of a Memorandum of Understanding (MOU) or other cooperative agreement between the Bureau of Land Management (BLM) and pertinent partners to maintain and enhance the area. Place notification of target shooting restriction on sections containing and adjacent to developed recreation facilities.

Monitoring (and Evaluation)	• Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies. • Monitor recreation setting condition through onsite patrols during the environmental education high use season (early fall and late spring).
Interdisciplinary Support Actions	Visual Resource Management Class II; closed to public motorized use.

T.2. Dry Creek Petrified Tree Management Area

Supporting Information and Rationale

The Dry Creek Petrified Tree SRMA is necessary to accommodate national visitor demand for nonmotorized recreational opportunities in semiarid sagebrush steppe ecoregions; this demand has been identified through focus groups, community involvement workshops, and through visitor use data. Dry Creek Petrified Tree is a unique parcel of BLM-administered land in respect to its abundant paleontological resources. This parcel provides seamless recreational opportunities as it connects with additional public lands. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand. The area has abundant prairie wildlife, a nearly pristine Powder River Basin viewshed, and a high probability for solitude. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand.

DRY CREEK/PETRIFIED TREE SPECIAL RECREATION MANAGEMENT AREA (SRMA) OBJECTIVES & DECISIONS
Objective Statement: Within the Dry Creek Petrified Tree SRMA, by the year 2015 and thereafter, participants in recreation assessments will report an average 4.0 realization of the targeted experiences and benefits (4.0 on a probability scale, where 1.0 equals not realized and 5.0 equals totally realized) listed below. The Dry Creek Petrified Tree SRMA will offer opportunities for recreationists to engage in picnicking, walking, nature viewing, and other forms of nonmotorized dispersed recreation in a partially modified physical recreation setting with predominantly nonmotorized public use. Within the management area, the existing natural and physical character of the landscape will be modified by recreational trail developments and associated recreation and interpretive facilities.
Activities: Picnicking, walking, nature viewing, environmental education, hunting *Experiences:* Enjoying having access to hands-on environmental learning, enjoying having access to close-to-home outdoor amenities, enjoying the closeness of friends and family *Benefits:* Greater retention of distinctive natural landscape features, increased appreciation of the area's geologic history.
RECREATION SETTING CHARACTERISTIC (RSC) DESCRIPTIONS
Physical Characteristics: Within a 0.5 mile of passenger vehicle routes. The character of the natural landscape within the Tipperary Road viewshed is partially maintained, with infrastructure and several ranch facilities visible. Desired future conditions will include maintained and marked trails, simple trailhead developments, a basic toilet and an interpretive display. *Social Characteristics:* From 2006 to 2010, the average annual estimated visitation was 956 visits and 110 visitor days (RMIS). Contacts with other groups are rare. Most groups consist of 2-5 people. Small areas of terrain alteration are present near the trailhead roads. The sounds of other people are rarely heard. *Operational Characteristics:* Foot travel is allowed; all use must be nonmotorized. Basic maps provided on trailhead kiosks, staff infrequently present to provide onsite assistance. Some regulatory and ethics signing is present in parking lots.
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Recreation and Visitor Services Program: Standard 14-day camping limit applies; developed site closed to recreational target shooting; currently not eligible for Federal Lands Recreation Enhancement Act but may be evaluated if future investments in visitor services meet eligibility requirements.

Oil & Gas Leasing/Minerals: Closed to leasing. Recommended for withdrawal from mineral entry. Salable mineral development for administrative use only.

VRM: Class II

Renewable Energy: Renewable energy exclusion area

Lands and Realty: Right-of-way (ROW) exclusion area

Travel Management: The interpretive trail area is closed to motorized use (~20 acres). Travel is limited to designated routes throughout the remainder of the SRMA. Identify routes to close and reclaim.

Special Recreation Permits (SRPs): Commercial guiding for hunting and competitive events will be prohibited within the 22 acre exclosure. Elsewhere, SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate.

Livestock Grazing: The 22-acre exclosure around the interpretive site is closed to grazing.

IMPLEMENTATION DECISIONS

Marketing: Provide maps and information at the field office. Directional signage present from both TW Road and Tipperary Road at I-90. Develop interpretive signs at trailhead/parking area on general location, history, paleontology, geology, and wildlife resources. Provide stewardship information to help preserve the special landscape character. Make available for outreach programs such as Conservation and Outdoor Recreation Education, Take It Outside, National Public Lands Day, etc.

Monitoring: Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows.

Management: Signs present at key access points; additional informational signs present along interpretive trail. Update interpretive trail signs as time and funding allow.

Administrative:

Recreation: Modify appropriate routes into nonmotorized trails.

Agreements: Establish cooperative agreements with Wyoming State Land Board and Wyoming Department of Game and Fish.

Partners: Pursue partnerships with Johnson County School Districts to establish an outdoor classroom.

Other administration: Recreational target shooting is prohibited within the developed site. Standard 14-day camping limit applies.

INTERPRETIVE TRAIL RECREATION MANAGEMENT ZONE (RMZ)

Outcome Objective

The Interpretive Trail RMZ will be sustained or enhanced for individuals or small groups of visitors to engage in nature and wildlife viewing, picnicking, environmental education and walking the interpretive trail so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in these Front Country settings:

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits

• Environmental Education • Picnicking • Walking • Nature Viewing	• Enjoying the sensory experience of a natural landscape • Enjoying having access to hands-on environmental learning • Learning more about this specific area • Enjoying having access to close-to-home outdoor amenities • Enjoying the closeness of friends and family	Personal: • Enhanced awareness and understanding of nature • Closer relationship with the natural world • Greater retention of distinctive natural landscape features • Increased appreciation of the area's geologic history • Improved mental health • Improved physical health • Greater appreciation of the outdoor environment Community/Social: • Feeling good about how natural resources and facilities are being managed Environmental: • Greater retention of distinctive natural landscape features. • Increased sense of stewardship for the resource • Greater protection of paleontological sites • Reduced looting and vandalism of historic/prehistoric sites • Reduced negative human impacts such as litter, vegetative trampling, and unplanned trails Economic: • Enhanced ability for visitors and resident to find areas providing desired recreation experiences and benefits

DESIRED FUTURE RECREATION SETTING CHARACTER		
Physical	Social	Operational
Remoteness: Within a 0.5 mile of passenger vehicle routes. *Naturalness:* Natural setting may have modifications that would be noticed but not draw the attention of an observer wandering through the area. *Facilities:* Maintained and marked trails, simple trailhead developments and basic toilets. Interpretive displays may also be incorporated.	*Contacts With Others:* Encounters with other groups are rare for visiting members of the general public. *Group Size:* Group sizes are expected to remain small (less than 5 people per group), unless an organized school or community groups visits as part of a field trip. *Evidence of use:* Areas of alteration uncommon. Little surface vegetation wear observed. Sounds of people infrequent.	*Mechanized Use:* Foot travel is allowed on trails. Mechanized and motorized use are prohibited within the interpretive site. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions.
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Consider the use of a Memorandum of Understanding or other cooperative agreement between the Bureau of Land Management and pertinent partners to maintain and enhance the area.

Monitoring (and Evaluation)	Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies.
Interdisciplinary Support Actions	Visual Resource Management Class II. Limit travel to designated routes; close interpretive site to motorized and mechanized use.

RED HORSE ACCESS RECREATION MANAGEMENT ZONE (RMZ)

Outcome Objective

The Red Horse Access RMZ will be sustained or enhanced for individuals or small groups of nonmotorized recreationists, to engage in nature and wildlife viewing, mountain biking and hiking so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in these Middle Country settings:

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits
• Hiking • Mountain Biking • Hunting	• Enjoying the sensory experience of a natural landscape • Enjoying having access to close-to-home outdoor amenities • Enjoying the closeness of friends and family	Personal: • Enhanced awareness and understanding of nature • Greater understanding of the importance of recreation and tourism in our community • Increased appreciation of the area's geologic history • Improved mental health • Improved physical health • Greater appreciation of the outdoor environment • Greater sense of responsibility for own quality of life • Greater appreciation for my public lands and how managers care for it Community/Social: • More informed citizenry about where to go for different kinds of recreation experiences and benefits Environmental: • Greater retention of distinctive natural landscape features • Increased sense of stewardship for the resource Economic: • Enhanced ability for visitors and resident to find areas providing desired recreation experiences and benefits

DESIRED FUTURE RECREATION SETTING CHARACTER

Physical	Social	Operational
Remoteness: Within a 0.5 mile of four-wheel drive vehicle routes. *Naturalness:* Natural setting may have modifications that would be noticed but not draw the attention of an observer wandering through the area. *Facilities:* Maintained and marked trails, simple trailhead developments and basic toilets.	*Contacts With Others:* Encounters with other groups are rare. *Group Size:* Group sizes are expected to remain small (less than 3 people per group) *Evidence of use:* Areas of alteration uncommon. Little surface vegetation wear observed. Sounds of people infrequent.	*Mechanized Use:* Mechanized travel is allowed on designated trails. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS

Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained.
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Consider the use of a Memorandum of Understanding or other cooperative agreement between the Bureau of Land Management and pertinent partners to maintain and enhance the area.
Monitoring (and Evaluation)	Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies.
Interdisciplinary Support Actions	Visual Resource Management Class II; travel limited to designated routes.

T.3. Hole-in-the-Wall Management Area

Supporting Information and Rationale

The Hole-in-the-Wall SRMA is necessary to accommodate national visitor demand for semi-primitive nonmotorized recreational opportunities in the Red Wall/southern Big Horns region; this demand has been identified by local organizations, community involvement workshops, and through visitor use data. The area has abundant wildlife, a nearly pristine Red Wall viewshed, and a moderate probability for solitude. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand.

HOLE-IN-THE-WALL SPECIAL RECREATION MANAGEMENT AREA (SRMA) OBJECTIVES & DECISIONS
Objective Statement: Within the Hole-in-the-Wall SRMA, by the year 2017 and thereafter, participants in recreation assessments will report an average 4.0 realization of the targeted experiences and benefits (4.0 on a probability scale, where 1.0 equals not realized and 5.0 equals totally realized) listed below. The Hole-in-the-Wall SRMA will offer opportunities for nonmotorized recreationists to engage in hiking, horseback riding, and nature viewing and other forms of nonmotorized dispersed recreation. Within the management area, the existing natural and physical character of the landscape will be modified only by primitive trail developments and minimal associated recreation and interpretive facilities.
Activities: Hiking, horseback riding, nature viewing, interpretation of natural and cultural resources, hunting, camping *Experiences:* Developing skills and abilities, testing endurance, savoring the total sensory experience of a landscape *Benefits:* Greater retention of distinctive natural landscape features; greater protection of area archaeological sites
RECREATION SETTING CHARACTERISTIC (RSC) DESCRIPTIONS

Physical Characteristics: Within a 0.5 mile of four-wheel drive routes. The character of the natural landscape within the viewshed is maintained, with a few modifications, such as ranch facilities visible. Desired future conditions will include maintained and marked trails, and simple trailhead developments, including interpretive panels.

Social Characteristics: Quantitative data related specifically to Hole-in-the-Wall does not yet exist. The majority of use is associated with commercially guided activities through neighboring ranches. During the peak visitation season (May. through Oct.) contacts are characterized by less than 3 encounters off travel routes and 3–6 encounters per day on travel routes. Outside of peak season, contacts are rare. Most groups consist of less than 3 people. Small areas of terrain alteration are present near major roads. The sounds of other people are rarely heard.

Operational Characteristics: Foot and horse travel are allowed cross-country; mechanized and motorized use is limited to designated routes. Basic maps provided on trailhead kiosks, staff infrequently present to provide onsite assistance. Some regulatory and ethics signing is present in parking lots. Moderate use restrictions apply at trailheads and staging areas.

MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Recreation and Visitor Services Program: Standard 14-day camping limit applies; prioritized for education efforts to mitigate recreational target shooting; currently not eligible for Federal Lands Recreation Enhancement Act but may be evaluated if future investments in visitor services meet eligibility requirements.

VRM: Class II

Travel Management: The area will be managed as limited to designated routes, with very few routes designated. Identify routes to close and reclaim. Modify appropriate routes into nonmotorized trails. Designated routes will be primarily for provision of public access to Hole-in-the-Wall trailhead and to provide egress for administrative use.

Renewable Energy: Renewable energy exclusion area

Lands and Realty: ROW exclusion area

Oil & Gas Leasing/Minerals: Closed to Leasing. Recommended for withdrawal from mineral entry. Salable mineral development for administrative use only.

Special Recreation Permits (SRPs): SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate.

IMPLEMENTATION DECISIONS

Marketing: Provide maps and information at the field office. Directional signage necessary from TTT Road, Willow Creek Road, and NC 105. Develop interpretive signs at trailhead/parking area on general location, history, geology, cultural and wildlife resources. Provide stewardship information to help preserve the special landscape character. Make available for outreach programs such as Conservation and Outdoor Recreation Education, Take It Outside, National Public Lands Day, etc.

Monitoring: Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows.

Management: Signs present at key access points; additional directional signs present along trails. High priority area for development of interpretive signs.

Administrative:

Agreements: Maintain cooperative agreements with Wyoming State Land Board and Wyoming Department of Game and Fish.

HOLE-IN-THE-WALL RECREATION MANAGEMENT ZONE (RMZ)

Outcome Objective

The Hole-in-the-Wall RMZ will be sustained or enhanced for visitors to engage in hiking, camping, horseback riding, and hunting (fall) so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in Back Country and Middle Country settings.

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits
• Hiking/backpacking • Camping • Hunting (fall season) • Horse riding/packing • Nature Viewing	• Enjoying the sensory experience of a natural landscape • Developing skills and abilities • Testing endurance • Being isolated and independent • Enjoying exploring on my own or in small groups • Enjoying nature • Feeling good about solitude	Personal: • Enhanced awareness and understanding of nature • Closer relationship with the natural world • Improved opportunity to view wildlife close-up • Improved mental health • Improved physical health • Greater appreciation of the outdoor environment • Feeling good about how this attraction is being used and enjoyed Community/Social: none identified Environmental: • Greater retention of distinctive natural landscape features • Increased sense of stewardship for the resource • Reduced negative human impacts such as litter, vegetative trampling, and unplanned trails Economic: • Maintenance of community's distinctive recreation/tourism market niche or character

DESIRED FUTURE RECREATION SETTING CHARACTER

Physical	Social	Operational
Remoteness: Within a 0.5 mile of four-wheel drive routes. *Naturalness:* Natural setting may have modifications that would be noticed but not draw the attention of an observer wandering through the area. *Facilities:* Rustic facilities such as campsites, a basic toilet, small kiosks, basic trailheads and marked trails.	*Contacts With Others:* Average encounters per day during peak hunting use season (September - November) would be fewer than 3 encounters off travel routes and 3–6 encounters on travel routes. *Group Size:* Group sizes are expected to remain small (less than 3 people per group). *Evidence of use:* Areas of alteration uncommon. Little surface vegetation wear observed. Sounds of people infrequent.	*Mechanized Use:* Nonmotorized, mechanized use is allowed on designated trails. Due to the steep topography, mechanized recreation is prohibited within the canyon. Should conflicts arise between mechanized use and other nonmotorized recreationists, the recreation area management plan will be adapted via a public comment period. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS

Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained. Continue to enhance the availability of dependable non-potable water sources for recreationists.
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Consider the use of a Memorandum of Understanding or other cooperative agreement between the Bureau of Land Management and pertinent partners to maintain and enhance the area.
Monitoring (and Evaluation)	• Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies. • Monitor recreation setting condition through onsite patrols during the high use season (August-November).
Interdisciplinary Support Actions	Visual Resource Management Class II; travel limited to designated routes.

BUFFALO CREEK RECREATION MANAGEMENT ZONE (RMZ)

Outcome Objective

The Buffalo Creek RMZ of the Hole-in-the-Wall Special Recreation Management Area (SRMA) will be sustained or enhanced for visitors to engage in camping, hiking, horseback riding, hunting (fall) and fishing so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in Back Country and Middle Country settings.

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits
• Camping • Fishing • Hiking/backpacking • Hunting (fall season) • Horse riding/packing • Nature Viewing	• Enjoying the sensory experience of a natural landscape • Developing skills and abilities • Testing endurance • Enjoying exploring on my own or in small groups • Enjoying nature • Feeling good about solitude, isolation, and independence	Personal: • Enhanced awareness and understanding of nature • Closer relationship with the natural world • Improved opportunity to view wildlife close-up • Improved mental health • Improved physical health • Greater appreciation of the outdoor environment • Enlarged sense of personal accountability for acting responsibly on public lands Community/Social: none identified Environmental: • Greater retention of distinctive natural landscape features • Increased sense of stewardship for the resource • Reduced wildlife disturbance from recreation facility development Economic: • Enhanced ability for visitors and resident to find areas providing desired recreation experiences and benefits

DESIRED FUTURE RECREATION SETTING CHARACTER

Physical	Social	Operational

Remoteness: Within 0.5 mile of four-wheel drive routes. *Naturalness:* Natural setting may have modifications that would be noticed but not draw the attention of an observer wandering through the area. *Facilities:* Rustic facilities such as campsites, a basic toilet, small kiosks, basic trailheads and marked trails.	*Contacts With Others:* Average encounters per day during peak hunting use season (September - November) would be less than 3 encounters off travel routes and 3–6 encounters on travel routes. *Group Size:* Group sizes are expected to remain small (less than 3 people per group). *Evidence of use:* Areas of alteration uncommon. Little surface vegetation wear observed. Sounds of people infrequent.	*Mechanized Use:* Nonmotorized, mechanized use is allowed on designated trails. Due to the steep topography, mechanized recreation is prohibited within the canyon. Should conflicts arise between mechanized use and other nonmotorized recreationists, the recreation area management plan will be adapted via a public comment period. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.
SUPPORT ACTIONS		
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained. Continue to enhance the availability of dependable non-potable water sources for recreationists.	
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.	
Administration	Consider the use of a Memorandum of Understanding or other cooperative agreement between the Bureau of Land Management and pertinent partners to maintain and enhance the area.	
Monitoring (and Evaluation)	• Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies. • Monitor recreation setting condition through onsite patrols during the high use season (August-November).	
Interdisciplinary Support Actions	Visual Resource Management Class II; travel limited to designated routes.	

T.4. Middle Fork Powder River Management Area

Supporting Information and Rationale

This SRMA is necessary to accommodate national visitor demand for semi-primitive nonmotorized recreational opportunities in the Red Wall/southern Big Horns region; this demand has been identified by local organizations, community involvement workshops, and through visitor use data. The area has abundant wildlife, a nearly pristine Red Wall viewshed, and a moderate probability for solitude. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand.

MIDDLE FORK POWDER RIVER SPECIAL RECREATION MANAGEMENT AREA (SRMA) OBJECTIVES & DECISIONS
Objective Statement: Within the Middle Fork Powder River SRMA, by the year 2016 and thereafter, participants in recreation assessments will report an average 4.0 realization of the targeted experiences and benefits (4.0 on a probability scale, where 1.0 equals not realized and 5.0 equals totally realized) listed below. The Middle Fork Powder River SRMA will offer opportunities for nonmotorized recreationists to engage in fishing, hunting, horseback riding, hiking, mountain biking, nature viewing and appropriate related off-highway vehicle (OHV) use. Within the management area, the existing natural and physical character of the landscape will be modified only by primitive trail developments and minimal associated recreation and interpretive facilities.
Activities: Fishing, camping, hunting, horseback riding, hiking, mountain biking, interpretation of natural and cultural resources, backpacking, OHV use in conjunction with aforementioned activities *Experiences:* Developing skills and abilities, testing endurance, enjoying having a wide variety of environments within a single recreation area, savoring the total sensory experience of a landscape *Benefits:* Greater sense of adventure, greater retention of distinctive natural landscape features; improved skills for outdoor enjoyment
RECREATION SETTING CHARACTERISTIC (RSC) DESCRIPTIONS
Physical Characteristics: Within a 0.5 mile of four-wheel drive routes in most of the region. The character of the natural landscape within the Middle Fork viewshed is largely maintained, with primitive routes and several ranch facilities visible. In the interior of the Middle Fork region, modification to the natural landscape is in harmony with surroundings. Desired future conditions will include maintained and marked trails, simple trailhead developments in the Ed O. Taylor Recreation Management Zone (RMZ) and rustic facilities such as campsites, basic toilets and interpretive displays in the Outlaw Cave RMZ. *Social Characteristics:* From 2006 to 2010, the average annual estimated visitation to the Middle Fork Region was 4701 visits and 4871 visitor days. During the peak use season (July through Oct.) contacts are characterized by 3-6 encounters off travel routes and 7-15 encounters per day on travel routes. Outside of peak season, contacts are rare. Most groups consist of less than 4–6 people. Small areas of terrain alteration are present near major roads. The sounds of other people are rarely heard. *Operational Characteristics:* Foot and horse travel and mechanized use (mountain bikes) are allowed; motorized use is limited to designated routes. Basic maps provided on trailhead kiosks, staff infrequently present to provide onsite assistance. Some regulatory and ethics signing is present in parking lots.
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Recreation and Visitor Services Program: Standard 14-day camping limit applies; prioritized for education efforts to mitigate impacts from recreational target shooting; currently not eligible for Federal Lands Recreation Enhancement Act but may be evaluated if future investments in visitor services meet eligibility requirements.

Oil & Gas Leasing/Minerals: Closed to leasing. Recommended for withdrawal from mineral entry. Salable mineral development for administrative use only.

VRM: Class II

Renewable Energy: Renewable energy exclusion area

Lands and Realty: ROW exclusion area

Travel Management: The area will be managed as limited to designated routes. Identify routes to close and reclaim. Modify appropriate routes into nonmotorized trails.

Special Recreation Permits (SRPs): SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate.

Livestock Grazing: Middle Fork Canyon is deemed unsuitable for grazing due to steep slopes.

WSRs: The canyon within 0.25 mile of the Middle Fork Powder River is managed under Manual 6400 – Wild and Scenic Rivers and the Middle Fork Powder River Interim Management Plan to protect outstandingly remarkable values.

IMPLEMENTATION DECISIONS

Marketing: Provide maps and information at the field office. Directional signage present from Highway 191 and Barnum Road. Develop interpretive signs at entrance to management area and at Outlaw Cave Campground on general location, history, geology, and wildlife resources. Provide stewardship information to help preserve the special landscape character. Make available for outreach programs such as Conservation and Outdoor Recreation Education, Take It Outside, National Public Lands Day, etc.

Monitoring: Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows.

Management: Signs present at key access points; additional directional signs present along trails. High priority area for development of interpretive signs.

Administrative:

Agreements: Maintain cooperative agreements with Wyoming State Land Board and Wyoming Department of Game and Fish.

OUTLAW CAVE RECREATION MANAGEMENT ZONE (RMZ)

Outcome Objective

The Outlaw Cave RMZ of the Middle Fork Canyon Special Recreation Management Area (SRMA) will be sustained or enhanced for visitors to engage in fishing, camping, hiking, horseback riding, hunting (fall) and appropriate off-highway vehicle (OHV) use so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in Back Country and Middle Country settings.

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits

• Camping • Fishing • Hiking/backpacking • Hunting (fall season) • Horse riding/packing • Nature Viewing • OHV Use	• Enjoying the sensory experience of a natural landscape • Developing skills and abilities • Testing endurance • Being isolated and independent • Enjoying exploring on my own or in small groups • Enjoying nature • Feeling good about solitude	Personal: • Enhanced awareness and understanding of nature • Closer relationship with the natural world • Improved opportunity to view wildlife close-up • Improved mental health • Improved physical health • Greater appreciation of the outdoor environment • Increased appreciation of area's cultural history Community/Social: none identified Environmental: • Greater retention of distinctive natural landscape features • Increased sense of stewardship for the resource Economic: • Enhanced ability for visitors and resident to find areas providing desired recreation experiences and benefits

DESIRED FUTURE RECREATION SETTING CHARACTER		
Physical	Social	Operational
Remoteness: Within 0.5 mile of four-wheel drive routes. *Naturalness:* Natural setting may have modifications that would be noticed but not draw the attention of an observer wandering through the area. *Facilities:* Rustic facilities such as campsites, a basic toilet, small kiosks, basic trailheads and marked trails.	*Contacts With Others:* Average encounters per day during peak hunting use season (September - November) would be approximately 3–6 encounters off travel routes and 7–15 encounters on travel routes. *Group Size:* Group sizes are expected to remain small (4–6 people per group). *Evidence of use:* Small areas of alteration present. Surface vegetation showing wear with some bare soils. Sounds of people infrequent.	*Mechanized Use:* Nonmotorized, mechanized use is allowed on designated trails. Due to the steep topography, mechanized recreation is prohibited within the canyon. Should conflicts arise between mechanized use and other nonmotorized recreationists, the recreation area management plan will be adapted via a public comment period. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained. Enhance the availability of dependable both potable and non-potable water sources for recreationists and packstock.
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Consider the use of a Memorandum of Understanding or other cooperative agreement between the Bureau of Land Management and pertinent partners to maintain and enhance the area.

Monitoring (and Evaluation)	• Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies. • Monitor recreation setting condition through onsite patrols during the high use season (August-November).
Interdisciplinary Support Actions	Visual Resource Management Class II; travel limited to designated routes.

ED O. TAYLOR RECREATION MANAGEMENT ZONE (RMZ)

Outcome Objective

The Ed O. Taylor RMZ of the Middle Fork Canyon Special Recreation Management Area (SRMA) will be managed in cooperation with Wyoming Game and Fish Department for visitors to engage in fishing, camping, hiking, horseback riding, hunting (fall) and appropriate related off-highway vehicle (OHV) use so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in Back Country and Middle Country settings.

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits
• Camping • Fishing • Hiking/backpacking • Hunting (fall season) • Horse riding/packing • Nature Viewing • OHV Use	• Enjoying the sensory experience of a natural landscape • Developing skills and abilities • Testing endurance • Feeling good about solitude, isolation and independence	Personal: • Enhanced awareness and understanding of nature • Closer relationship with the natural world • Improved opportunity to view wildlife close-up • Improved mental health • Improved physical health • Greater appreciation of the outdoor environment • Better understanding of wildlife's contribution to own quality of life Community/Social: none identified Environmental: • Greater retention of distinctive natural landscape features • Increased sense of stewardship for the resource • Reduced wildlife harassment by recreation users • Reduced wildlife disturbance from recreation facility development Economic: • Enhanced ability for visitors and resident to find areas providing desired recreation experiences and benefits

DESIRED FUTURE RECREATION SETTING CHARACTER

Physical	Social	Operational

Remoteness: Within 0.5 mile of four-wheel drive routes. *Naturalness:* Natural setting may have modifications that would be noticed but not draw the attention of an observer wandering through the area. *Facilities:* Rustic facilities such as campsites, a basic toilet, small kiosks, basic trailheads and marked trails.	*Contacts With Others:* Average encounters per day during peak hunting use season (September - November) would be approximately 3–6 encounters off travel routes and 7–15 encounters on travel routes. *Group Size:* Group sizes are expected to remain small (4–6 people per group). *Evidence of use:* Small areas of alteration present. Surface vegetation showing wear with some bare soils. Sounds of people infrequent.	*Mechanized Use:* Nonmotorized, mechanized use is allowed on designated trails. Due to the steep topography, mechanized recreation is prohibited within the canyon. Should conflicts arise between mechanized use and other nonmotorized recreationists, the recreation area management plan will be adapted via a public comment period. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained. Continue to enhance the availability of dependable non-potable water sources for recreationists.
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Consider the use of a Memorandum of Understanding or other cooperative agreement between the Bureau of Land Management and pertinent partners to maintain and enhance the area.
Monitoring (and Evaluation)	• Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies. • Monitor recreation setting condition through onsite patrols during the high use season (August-November).
Interdisciplinary Support Actions	Visual Resource Management Class II; travel limited to designated routes.

T.5. Mosier Gulch Management Area

Supporting Information and Rationale

The Mosier Gulch SRMA is necessary to accommodate local visitor demand for nonmotorized recreational opportunities near the City of Buffalo; this demand has been identified through focus groups, community involvement workshops, and through visitor use data. Mosier Gulch is located within 3 miles of the Buffalo City Limits. This parcel provides seamless recreational opportunities as it connects with the Buffalo Greenbelt and additional public lands. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand. The area boasts excellent fishing opportunities and easy access to natural resource based recreational opportunities. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand.

MOSIER GULCH SPECIAL RECREATION MANAGEMENT AREA (SRMA) OBJECTIVES & DECISIONS

Objective Statement: Within the Mosier Gulch SRMA, by the year 2015 and thereafter, participants in recreation assessments will report an average 4.0 realization of the targeted experiences and benefits (4.0 on a probability scale, where 1.0 equals not realized and 5.0 equals totally realized) listed below. The Mosier Gulch SRMA will offer opportunities for recreationists to engage in jogging, hiking, mountain biking, fishing, hunting and nature viewing and other forms of nonmotorized dispersed recreation in a partially modified physical recreation setting with predominantly nonmotorized public use. Within the management area, the existing natural and physical character of the landscape will be modified by recreational trail developments and associated recreation and interpretive facilities.

Activities: Trail system access for jogging, walking, hiking, mountain biking, picnicking, and fishing.

Experiences: Enjoying frequent exercise, enjoying having easy access to natural landscapes, enjoying having access to close-to-home outdoor amenities.

Benefits: Improved physical fitness and health maintenance, heightened sense of community sense of place, lifestyle improvement, increased desirability as a place to live or retire.

RECREATION SETTING CHARACTERISTIC (RSC) DESCRIPTIONS

Physical Characteristics: Within 0.5 mile of paved/primary roads and highways; character of the natural landscape partially modified but none overpower the natural landscape; maintained and marked trails, simple trailhead developments and basic toilet.

Social Characteristics: From 2006 to 2010, the average annual estimated visitation was 2386 visits and 355 visitor days (RMIS). Approximately 5-8 encounters per day off travel routes (staging areas) and approximately 5 encounters on travel routes. Most groups consist of 2-5 people. Small areas of terrain alteration are prevalent near the trailhead and parking areas. Surface vegetation gone with compacted soils observed. The sounds of other people are regularly heard.

Operational Characteristics: Foot travel and mountain bikes are predominate, motorized use allowed only on main road. Basic information provided, staff infrequently present. Some regulatory and ethics signing, moderate use restrictions.

MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Recreation and Visitor Services Program: Standard 14-day camping limit applies; developed site closed to camping and recreational target shooting; currently not eligible for Federal Lands Recreation Enhancement Act but may be evaluated if future investments in visitor services meet eligibility requirements.

Oil & Gas Leasing/Minerals: Closed to leasing. Recommended for withdrawal from mineral entry. Salable mineral development for administrative use only.

VRM: Class II

Renewable Energy: Renewable energy exclusion area

Lands and Realty: Rights-of-Way (ROW) exclusion area

Special Recreation Permits (SRPs): SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate.

Travel Management: The area will be managed as limited to designated routes, with very few routes designated. Identify routes to close and reclaim. Modify appropriate routes into nonmotorized trails. Designated routes will be primarily for provision of access to provide egress for administrative use.

Livestock Grazing: The picnic area is closed to grazing. The 120-acre parcel along Clear Creek Trail on Grouse Mountain is deemed unsuitable for grazing due to steep slopes.

IMPLEMENTATION DECISIONS

Marketing: Provide maps and information at the field office. Directional signage present from Highway 16. Develop interpretive signs at trailhead/parking area on general location, history, geology, and wildlife resources. Provide stewardship information to help preserve the special landscape character. Make available for outreach programs such as Conservation and Outdoor Recreation Education, Take It Outside, National Public Lands Day, etc.

Monitoring: Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows.

Management: Signs present at key access points. Develop trailheads for foot, horse and bicycle travel.

Administrative:

Agreements: Maintain cooperative agreements with City of Buffalo, U.S. Forest Service and Johnson County.

Partners: City of Buffalo, Buffalo Trails Board, U.S. Forest Service Powder River Ranger District, Johnson County Recreation District, and Wyoming Department of Game and Fish.

MOSIER PICNIC AREA RECREATION MANAGEMENT ZONE RMZ

Outcome Objective

The Mosier Gulch Picnic Area RMZ will be sustained or enhanced for individuals or small groups of nonmotorized recreationists, to engage in nature and wildlife viewing, picnicking and walking the interpretive trail so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in these Front Country settings:

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits
● Picnicking ● Fishing ● Nature Viewing	● Increased desirability as a place to live or retire ● Enjoying having easy access to natural landscapes ● Enjoying having access to close-to-home outdoor amenities ● Enjoying the closeness of friends and family	Personal: ● Closer relationship with the natural world ● Improved mental health ● Improved physical health ● Greater appreciation of the outdoor environment ● Greater awareness that this community is a special place ● Improved sense of personal responsibility for control of domestic pets Community/Social: ● Improved community integration ● Lifestyle improvement or maintenance ● Heightened sense of community satisfaction Environmental: ● Greater community ownership and stewardship of park, recreation, and natural resources ● Reduced negative human impacts such as litter, vegetative trampling, and unplanned trails Economic: ● Increased desirability as a place to live or retire

DESIRED FUTURE RECREATION SETTING CHARACTER

Physical	Social	Operational

Remoteness: Within a 0.5 mile of paved/primary roads and highways. *Naturalness:* Character of natural landscape partially modified but none overpower natural landscape. *Facilities:* Maintained and marked trails, simple trailhead developments and basic toilets. Interpretive displays may also be incorporated.	*Contacts With Others:* Encounters with other groups average 2-4 encounters per day in staging areas and fewer than 5 encounters on travel routes. *Group Size:* Group sizes are expected to remain small (less than 5 people per group). *Evidence of use:* Small areas of terrain alteration are prevalent near the trailhead and parking areas. Surface vegetation gone with compacted soils observed. Sounds of other people common.	*Mechanized Use:* Mechanized travel is allowed only on designated trails. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained.
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Continue Memorandum of Understanding and consider other cooperative agreements between the Bureau of Land Management and pertinent partners to maintain and enhance the area.
Monitoring (and Evaluation)	Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies.
Interdisciplinary Support Actions	Visual Resource Management Class II; travel limited to designated routes.

CLEAR CREEK TRAIL SYSTEM RECREATION MANAGEMENT ZONE (RMZ)		
Outcome Objective The Clear Creek Trail System RMZ will be sustained or enhanced for individuals or small groups of nonmotorized recreationists, to engage in nature and wildlife viewing, walking and hiking the Clear Creek trail so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in these Front Country settings:		
TARGETED OPPORTUNITIES & OUTCOMES		
Activity Opportunities	Outcomes	
	Experiences	Benefits

• Jogging • Mountain Biking • Walking • Hiking • Nature Viewing	• Enjoying frequent exercise • Enjoying having easy access to natural landscapes • Enjoying having access to close-to-home outdoor amenities • Enjoying the closeness of friends and family	Personal: • Closer relationship with the natural world • Improved mental health • Improved physical health • Greater appreciation of the outdoor environment • Improved sense of personal responsibility for control of domestic pets Community/Social: • Improved community integration • Lifestyle improvement or maintenance • Heightened sense of community satisfaction Environmental: • Greater community ownership and stewardship of park, recreation, and natural resources • Maintenance of distinctive recreation setting character Economic: • Increased desirability as a place to live or retire

DESIRED FUTURE RECREATION SETTING CHARACTER		
Physical	Social	Operational
Remoteness: Within a 0.5 mile of paved/primary roads and highways. *Naturalness:* Character of natural landscape partially modified but none overpower natural landscape. *Facilities:* Maintained and marked trails, simple trailhead developments and basic toilets. Interpretive displays may also be incorporated.	*Contacts With Others:* Encounters with other groups average 2-4 encounters per day in staging areas and fewer than 5 encounters on travel routes. *Group Size:* Group sizes are expected to remain small (less than 5 people per group). *Evidence of use:* Small areas of terrain alteration are prevalent near the trailhead and parking areas. Surface vegetation gone with compacted soils observed. Sounds of other people common.	*Mechanized Use:* Mechanized travel is allowed only on designated trails. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained.
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Continue Memorandum of Understanding and consider other cooperative agreements between the Bureau of Land Management and pertinent partners to maintain and enhance the area.
Monitoring (and Evaluation)	Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies.
Interdisciplinary Support Actions	Visual Resource Management Class II; travel limited to designated routes.

NORTH RIDGE RECREATION MANAGEMENT ZONE (RMZ)

Outcome Objective

The North Ridge RMZ will be sustained or enhanced for individuals or small groups of nonmotorized recreationists, to engage in nature and wildlife viewing, hunting and fishing so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in these Front Country:

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits
• Hunting • Nature Viewing	• Enjoying having easy access to natural landscapes • Enjoying maintaining out-of-town country solitude	Personal: • Closer relationship with the natural world • Improved mental health • Improved physical health • Greater appreciation of the outdoor environment Community/Social: • Heightened sense of community satisfaction Environmental: • Greater community ownership and stewardship of park, recreation, and natural resources • Greater protection of fish, wildlife, and plant habitat from growth, development, and public use impacts Economic: • Increased desirability as a place to live or retire

DESIRED FUTURE RECREATION SETTING CHARACTER

Physical	Social	Operational
Remoteness: Within a 0.5 mile of paved/primary roads and highways. *Naturalness:* Character of natural landscape retained. A few modifications contrast with character of the landscape (e.g., fences, primitive roads). *Facilities:* No structures. Foot/horse trails only.	*Contacts With Others:* Encounters with other groups average fewer than 3 encounters off of travel routes. *Group Size:* Group sizes are expected to remain small (less than 3 people per group). *Evidence of use:* Areas of alteration uncommon. Little surface vegetation wear observed. Sounds of people infrequent.	*Mechanized Use:* Mechanized travel is allowed only on designated trails. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS

Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained.
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Continue Memorandum of Understanding and consider other cooperative agreements between the Bureau of Land Management and pertinent partners to maintain and enhance the area.

Monitoring (and Evaluation)	Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies.
Interdisciplinary Support Actions	Visual Resource Management Class II; travel limited to designated routes.

T.6. Welch Ranch Management Area

SUPPORTING INFORMATION

This SRMA is necessary to accommodate local visitor demand for nonmotorized recreational opportunities near the City of Sheridan; this demand has been identified through focus groups, community involvement workshops, and through visitor use data. The Welch Ranch is located approximately 10 miles from Sheridan city limits. The Welch Ranch parcel offers public access to riparian areas, a unique opportunity for BLM-administered lands in northeastern Wyoming. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand. The area boasts excellent fishing opportunities and easy access to natural resource based recreational opportunities. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand.

WELCH RANCH SPECIAL RECREATION MANAGEMENT AREA (SRMA) OBJECTIVES & DECISIONS
Objective Statement: Within the Welch Ranch SRMA, by the year 2015 and thereafter, participants in recreation assessments will report an average 4.0 realization of the targeted experiences and benefits (4.0 on a probability scale, where 1.0 equals not realized and 5.0 equals totally realized) listed below. The Welch Ranch SRMA will offer opportunities for recreationists to engage in physical exercise, hiking, mountain biking, fishing, hunting and nature viewing and other forms of nonmotorized dispersed recreation in a partially modified physical recreation setting with predominantly nonmotorized public use. Within the management area, the existing natural and physical character of the landscape will be modified by recreational trail developments and associated recreation and interpretive facilities.
Activities: Hiking, mountain biking, fishing, hunting, environmental education. *Experiences:* Enjoying frequent exercise, enjoying having easy access to natural landscapes, enjoying having access to close-to-home outdoor amenities. *Benefits:* Improved physical fitness and health maintenance, a heightened sense of community sense of place, lifestyle improvement, greater freedom from urban living.
RECREATION SETTING CHARACTERISTIC (RSC) DESCRIPTIONS
Physical Characteristics: Within 0.5 mile of paved/primary roads and highways at east entrance; character of the natural landscape partially modified but none overpower the natural landscape; maintained and marked trails, simple trailhead developments. *Social Characteristics:* From 2006 to 2010, the average annual estimated visitation was 1181 visits and 510 visitor days (RMIS). Contacts with other groups are not uncommon during high use seasons. Most groups consist of 2-4 people. Small areas of terrain alteration are present, but are attributed mostly to cattle operations. The sounds of other people are rarely heard. Approximately 1-2 encounters per day off travel routes (staging areas) and few encounters on travel routes. *Operational Characteristics:* Foot travel and mountain bikes are predominate, motorized use prohibited. Basic information provided, staff infrequently present. Some regulatory and ethics signing, moderate use restrictions.
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Recreation and Visitor Services Program: Campfires prohibited, camping prohibited in the parking areas and at trailheads; standard 14-day camping limit applies outside of parking areas; closed to recreational target shooting; currently not eligible for Federal Lands Recreation Enhancement Act but may be evaluated if future investments in visitor services meet eligibility requirements.

Oil & Gas Leasing/Minerals: Recommended for withdrawal from mineral entry. Salable mineral development for administrative use only. The area is closed to leasing of fluid minerals. Note: A portion of the leasable fluid minerals are not administered by the BLM.

VRM: Class II

Renewable Energy: Renewable energy exclusion area

Lands and Realty: ROW exclusion area

Special Recreation Permits (SRPs): SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate.

Travel Management: The area will be managed as limited to designated routes; designated routes will provide egress for administrative use only. Identify routes to close and reclaim.

Areas of Critical Environmental Concern (ACECs): Welch Ranch ACEC relevant and important values will be incorporated into an ACEC and/or Recreation Area Management Plan.

IMPLEMENTATION DECISIONS

Marketing: Provide maps and information at the field office. Directional signage present from Highway 339. Develop interpretive signs at trailhead/parking area on general location, history, geology, and wildlife resources. Provide stewardship information to help preserve the special landscape character. Make available for outreach programs such as Conservation and Outdoor Recreation Education, Take It Outside, National Public Lands Day, etc.

Monitoring: Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows.

Management: Signs present at key access points. Develop trailheads for foot, horse and bicycle travel.

Administrative:

Agreements: Seek out cooperative agreements with interested organizations.

Partners: Sheridan Community Land Trust, Sheridan Public Land Users, Wyoming State Land Board and Wyoming Department of Game and Fish, Sheridan County Conservation District. Pursue partnerships with Sheridan College, Sheridan County School District, private schools, non-profit organization including the YMCA, Boys and Girls Club and Science Kids to establish an outdoor classroom.

Other administration: Travel limited to designated routes and for administrative use only. Modify appropriate routes into nonmotorized trails. Livestock grazing will be managed in concert with other resource values under a site-specific allotment management plan. Overlaps ACEC (Appendix S (p. 2531)).

TONGUE RIVER RECREATION MANAGEMENT ZONE (RMZ)

Outcome Objective

The Tongue River RMZ will be sustained or enhanced for individuals or small groups of nonmotorized recreationists, to engage in nature and wildlife viewing, fishing, hunting and foot and horse travel so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below:

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits

• Boating • Fishing • Environmental Education • Nature Viewing	• Enjoying frequent exercise • Enjoying having easy access to natural landscapes • Enjoying having access to close-to-home outdoor amenities • Enjoying the closeness of friends and family	Personal: • Closer relationship with the natural world • Improved mental health • Improved physical health • Greater appreciation of the outdoor environment Community/Social: • Improved community integration • Lifestyle improvement or maintenance • Heightened sense of community satisfaction Environmental: • Greater community ownership and stewardship of park, recreation, and natural resources • Maintenance of distinctive recreation setting character • Reduced wildlife disturbance from recreation facility development • Improved soil, water, and air quality • Greater protection of fish, wildlife, and plant habitat from growth, development, and public use impacts Economic: • Increased desirability as a place to live or retire

DESIRED FUTURE RECREATION SETTING CHARACTER		
Physical	Social	Operational
Remoteness: Within a 0.5 mile of paved/primary roads and highways. *Naturalness:* Character of natural landscape partially modified but none overpower natural landscape. *Facilities:* Maintained and marked trails, simple trailhead developments and basic toilets. Interpretive displays may also be incorporated.	*Contacts With Others:* Encounters with other groups average 2-4 encounters per day in staging areas and fewer than 5 encounters on travel routes. *Group Size:* Group sizes are expected to remain small (less than 5 people per group). *Evidence of use:* Small areas of terrain alteration are prevalent near the trailhead and parking areas. Surface vegetation gone with compacted soils observed. Sounds of other people common.	*Mechanized Use:* Mechanized travel is allowed only on designated trails. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained.
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Consider other cooperative agreements between the Bureau of Land Management and pertinent partners to maintain and enhance the area.

Monitoring (and Evaluation)	Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies.
Interdisciplinary Support Actions	Visual Resource Management Class II. Mechanized and nonmotorized travel on designated trails. Motorized travel for administrative use only. Area of Critical Environmental Concern designation; discussed in Appendix S (p. 2531).

RIVER BOTTOM RECREATION MANAGEMENT ZONE (RMZ)

Outcome Objective

The River Bottom RMZ will be sustained or enhanced for individuals or small groups of nonmotorized recreationists, to engage in nature and wildlife viewing, fishing, hunting and foot and horse travel so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below:

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits
• Jogging • Walking • Hiking • Environmental Education • Mountain Biking • Horseback Riding • Fishing • Nature Viewing • Hunting	• Enjoying frequent exercise • Enjoying having easy access to natural landscapes • Enjoying having access to close-to-home outdoor amenities • Enjoying the closeness of friends and family	Personal: • Closer relationship with the natural world • Improved mental health • Improved physical health • Greater appreciation of the outdoor environment Community/Social: • Improved community integration • Lifestyle improvement or maintenance • Heightened sense of community satisfaction Environmental: • Greater community ownership and stewardship of park, recreation, and natural resources • Maintenance of distinctive recreation setting character • Improved soil, water, and air quality • Greater protection of fish, wildlife, and plant habitat from growth, development, and public use impacts Economic: • Increased desirability as a place to live or retire

DESIRED FUTURE RECREATION SETTING CHARACTER

Physical	Social	Operational
Remoteness: Within a 0.5 mile of mechanized routes. *Naturalness:* Character of natural landscape partially modified but none overpower natural landscape. *Facilities:* Maintained and marked trails, simple trailhead developments and basic toilets. Interpretive displays may also be incorporated.	*Contacts With Others:* Encounters with other groups average 2-4 encounters per day in staging areas and fewer than 5 encounters on travel routes. *Group Size:* Group sizes are expected to remain small (less than 5 people per group). *Evidence of use:* Small areas of terrain alteration are prevalent near the trailhead and parking areas. Surface vegetation gone with compacted soils observed. Sounds of other people common.	*Mechanized Use:* Mechanized travel is allowed only on designated trails. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS

Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained.
Information and Education (including promotion & interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Continue Memorandum of Understanding and consider other cooperative agreements between the Bureau of Land Management and pertinent partners to maintain and enhance the area.
Monitoring (and Evaluation)	Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies.
Interdisciplinary Support Actions	Visual Resource Management Class II. Mechanized and nonmotorized travel on designated trails. Motorized travel for administrative use only. Area of Critical Environmental Concern designation; discussed in Appendix S (p. 2531).

UPLAND RECREATION MANAGEMENT ZONE (RMZ)

Outcome Objective

The Upland RMZ will be sustained or enhanced for individuals or small groups of nonmotorized recreationists, to engage in horseback riding, hiking, camping, hunting and nature viewing so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below:

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits
• Hiking • Camping • Hunting	• Enjoying having easy access to natural landscapes • Enjoying having access to close-to-home outdoor amenities • Enjoying maintaining out-of-town country solitude	Personal: • Closer relationship with the natural world • Improved mental health • Improved physical health • Greater appreciation of the outdoor environment Community/Social: • Heightened sense of community satisfaction Environmental: • Greater community ownership and stewardship of park, recreation, and natural resources • Maintenance of distinctive recreation setting character Economic: • Increased desirability as a place to live or retire

DESIRED FUTURE RECREATION SETTING CHARACTER

Physical	Social	Operational

Remoteness: Within a mile of paved/primary roads and highways. *Naturalness:* Character of natural landscape retained. A few modifications contrast with character of the landscape (e.g., fences, primitive roads). *Facilities:* No structures. Foot/horse trails only.	*Contacts With Others:* Encounters with other groups average fewer than 3 encounters off of travel routes. *Group Size:* Group sizes are expected to remain small (less than 3 people per group). *Evidence of use:* Areas of alteration uncommon. Little surface vegetation wear observed. Sounds of people infrequent.	*Mechanized Use:* Mechanized travel is allowed only on designated trails. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained.
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Continue Memorandum of Understanding and consider other cooperative agreements between the Bureau of Land Management and pertinent partners to maintain and enhance the area.
Monitoring (and Evaluation)	Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies.
Interdisciplinary Support Actions	Visual Resource Management Class II. Mechanized and nonmotorized travel on designated trails. Motorized travel for administrative use only. Area of Critical Environmental Concern designation; discussed in Appendix S (p. 2531).

T.7. Weston Hills Management Area

Supporting Information

This SRMA is necessary to accommodate local visitor demand for motorized recreational opportunities near the City of Gillette; this demand has been identified by community involvement workshops, and through visitor use data. Weston Hills is located within 25 miles of the Gillette city limits. This parcel provides seamless recreational opportunities as it connects with Thunder Basin National Grassland and additional public lands. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand.

WESTON HILLS SPECIAL RECREATION MANAGEMENT (SRMA) OBJECTIVES & DECISIONS
Objective Statement: Within the Weston Hills SRMA, by the year 2016 and thereafter, participants in recreation assessments will report an average 4.0 realization of the targeted experiences and benefits (4.0 on a probability scale, where 1.0 equals not realized and 5.0 equals totally realized) listed below. The Weston Hills SRMA will offer opportunities for recreationists to engage in off-highway vehicle (OHV) use, camping, hunting and nature viewing and other forms of dispersed recreation in a partially modified physical recreation setting with both motorized and nonmotorized public use. Within the management area, the existing natural and physical character of the landscape will be modified by recreational trail developments and associated recreation facilities.

Activities: OHV use, fishing, hunting, and camping.

Experiences: Enjoying having easy access to natural landscapes, enjoying having access to close-to-home outdoor amenities.

Benefits: Heightened sense of community sense of place, lifestyle improvement.

RECREATION SETTING CHARACTERISTIC (RSC) DESCRIPTIONS

Physical Characteristics: Within 0.5 mile of paved/primary roads and highways; character of the natural landscape partially modified but none overpower the natural landscape; maintained and marked trails, simple trailhead developments and basic toilet.

Social Characteristics: From 2006 to 2010, the average annual estimated visitation was 3,920 visits and 2,167 visitor days (RMIS). Most groups consist of 3-6 people. Approximately 3-6 encounters per day off travel routes (staging areas) and approximately 4-8 encounters on travel routes. Small areas of terrain alteration are prevalent near the trailhead and parking areas. Surface vegetation gone with compacted soils observed. The sounds of other people are regularly heard.

Operational Characteristics: Motorized use predominates, motorized use allowed on designated routes. Basic information provided, staff infrequently present. Some regulatory and ethics signing, moderate use restrictions.

MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Recreation and Visitor Services Program: Campfires prohibited. Not a fee site; not currently suitable for Federal Lands Recreation Enhancement Act (FLREA). The site may be evaluated in conjunction with U.S. Forest Service under FLREA if additional amenities are provided in the future.

Oil & Gas Leasing/Minerals: Lease fluid minerals with a Controlled Surface Use (CSU). Recommended for withdrawal from mineral entry. Salable mineral development for administrative use only.

VRM: Class II

Renewable Energy: Renewable energy exclusion area

Lands and Realty: ROW exclusion area

Travel Management: The area will be managed as limited to designated routes, with several routes designated. Routes will be classified by type of use (public or administrative), vehicle type (i.e., passenger vehicle, four-wheel drive, vehicles 50” or less) and maintenance level. Identify routes to close and reclaim.

Special Recreation Permits (SRPs): SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate.

IMPLEMENTATION DECISIONS

Marketing: Provide maps and information at the field office. Directional signage present from Highway 59. Develop interpretive signs at trailhead/parking area on general location, history, geology, and wildlife resources. Provide stewardship information to help preserve the special landscape character. Make available for outreach programs such as Conservation and Outdoor Recreation Education, Take It Outside, National Public Lands Day, etc.

Monitoring: Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows.

Management: Signs present at key access points. Develop trailheads for foot, horse and bicycle travel.

Administrative:

Agreements: Create and maintain cooperative agreements with U.S. Forest Service and other interested organizations.

Partners: U.S. Forest Service Douglas Ranger District, Campbell County, Wyoming State Land Board and Wyoming Department of Game and Fish.

THE LOOP RECREATION MANAGEMENT ZONE (RMZ)

Outcome Objective

The Loop RMZ will be sustained or enhanced for individuals or small groups of motorized recreationists, to engage in off-highway vehicle (OHV) use, camping and nature and wildlife viewing so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in these Front Country settings:

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits
• OHV use • Camping	• Enjoying having easy access to natural landscapes • Enjoying having access to close-to-home outdoor amenities • Enjoying the closeness of friends and family	Personal: • Improved mental health • Improved physical health Community/Social: • Lifestyle improvement or maintenance • Heightened sense of community satisfaction Environmental: • Greater community ownership and stewardship of park, recreation, and natural resources • Maintenance of distinctive recreation setting character Economic: • Increased desirability as a place to live or retire

DESIRED FUTURE RECREATION SETTING CHARACTER

Physical	Social	Operational

Remoteness: Within a 0.5 mile of passenger roads. *Naturalness:* Character of natural landscape considerably modified. *Facilities:* Maintained and marked routes, simple trailhead developments and basic toilets. Interpretive displays may also be incorporated.	*Contacts With Others:* Encounters with other groups average 2-4 encounters per day in staging areas and fewer than 5 encounters on travel routes. *Group Size:* Group sizes are expected to remain small (less than 5 people per group). *Evidence of use:* Large areas of terrain alteration are prevalent near "the Loop" and parking areas. Surface vegetation gone with compacted soils observed. Sounds of other people common.	*Mechanized Use:* Mechanized travel is allowed only on designated trails. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained.
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Continue Memorandum of Understanding and consider other cooperative agreements between the Bureau of Land Management and pertinent partners to maintain and enhance the area.
Monitoring (and Evaluation)	Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies.
Interdisciplinary Support Actions	Visual Resource Management Class II

DISPERSED USE RECREATION MANAGEMENT ZONE (RMZ)

Outcome Objective

The Weston Hills Dispersed Use RMZ will be sustained or enhanced for individuals or small groups of motorized recreationists, to engage in off-highway vehicle (OHV) use, camping and nature and wildlife viewing so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in these Front Country and Middle Country settings:

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits

• Hunting • Hiking • Camping	• Enjoying having easy access to natural landscapes • Enjoying having access to close-to-home outdoor amenities • Enjoying the closeness of friends and family	Personal: • Improved mental health • Improved physical health Community/Social: • Lifestyle improvement or maintenance • Heightened sense of community satisfaction Environmental: • Greater community ownership and stewardship of park, recreation, and natural resources • Maintenance of distinctive recreation setting character Economic: • Increased desirability as a place to live or retire

DESIRED FUTURE RECREATION SETTING CHARACTER		
Physical	Social	Operational
Remoteness: Within a 0.5 mile of four-wheel drive roads. *Naturalness:* Character of natural landscape partially modified. *Facilities:* Maintained and marked routes, simple trailhead developments and basic toilets. Interpretive displays may also be incorporated.	*Contacts With Others:* Encounters with other groups average 2-4 encounters per day in staging areas and fewer than 5 encounters on travel routes. *Group Size:* Group sizes are expected to remain small (less than 5 people per group). *Evidence of use:* Large areas of terrain alteration are prevalent near "the Loop" and parking areas. Surface vegetation gone with compacted soils observed. Sounds of other people common.	*Mechanized Use:* Mechanized travel is allowed only on designated trails. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained.
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Continue Memorandum of Understanding and consider other cooperative agreements between the Bureau of Land Management and pertinent partners to maintain and enhance the area.
Monitoring (and Evaluation)	Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies.
Interdisciplinary Support Actions	Visual Resource Management Class II; travel limited to designated routes.

T.8. Extensive Recreation Management Areas

Extensive Recreation Management Areas (ERMAs) are administrative units managed:

1. To address recreation use, demand, or existing Recreation and Visitor Services program investments.
2. To support and sustain the principal recreation activities and the associated qualities and conditions.
3. Commensurate with the management of other resources and resource uses.

The Proposed Resource Management Plan does not generally propose any special management restrictions (i.e., rights-of-way avoidance, closures to leasing, etc.) to protect the recreation values within ERMAs. The objectives of the recreation program within ERMAs will be considered commensurate with other resources and resource uses in site-specific analysis. Mitigation of impacts to recreation in ERMAs in subsequent site-specific National Environmental Policy Act documents will be an implementation level decision, subject to consideration of the objectives identified for each ERMA. ERMAs do overlap with management actions proposed for other resources and the "Management Actions and Allowable Uses" sections listed below reflect the management selected in the Proposed Resource Management Plan across all resources.

T.8.1. Cabin Canyon Management Area

Supporting Information and Rationale

This ERMA is necessary to accommodate multiple use mandates through reduction of user conflicts primarily related to user created motorized routes. This ERMA is also necessary to accommodate local visitor demand for motorized recreational opportunities near the City of Gillette; this demand has been identified by onsite customers, community involvement workshops, and through visitor use data. Cabin Canyon is located within 25 miles of the Gillette city limits. ERMA management will accommodate visitor demand, minimize conflicts with other uses (i.e., mineral development) and prevent inadvertent trespass.

CABIN CANYON EXTENSIVE RECREATION MANAGEMENT AREA (ERMA) OBJECTIVES & DECISIONS
Objective Statement: Manage the Cabin Canyon ERMA for motorized recreationists to engage in off-highway vehicle (OHV) use, hunting and nature viewing so that they realize a "moderate" level of the targeted experience and benefit outcomes in the Front and Middle Country settings.
Activities: OHV use, hunting, camping and nature viewing. *Experiences:* Enjoying having easy access to natural landscapes, enjoying having access to close-to-home outdoor amenities, improved respect for privately owned lands. *Benefits:* Improved understanding of how this community's rural-urban interface impacts its quality of life; greater respect for private property and local lifestyles.
RECREATION SETTING CHARACTERISTIC (RSC) DESCRIPTIONS
Physical Characteristics: Within 0.5 mile of paved/primary roads and highways; character of the natural landscape partially modified but none overpower the natural landscape; maintained and marked trails, simple trailhead developments. *Social Characteristics:* Quantitative visitor use data does not yet exist for the Cabin Canyon area. A few large areas of terrain alteration exist; largely associated with user created routes and campsites. Surface vegetation is absent in places with hardened soils observed. The sounds of other people are occasionally heard. *Operational Characteristics:* Motorized use predominates, motorized use allowed on designated routes. Basic information should be provided, staff infrequently present. Some regulatory and ethics signing, moderate use restrictions.
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Recreation and Visitor Services Program: Campfires prohibited, standard 14-day camping limit applies; prioritized for education efforts to mitigate recreational target shooting; currently not eligible for Federal Lands Recreation Enhancement Act but may be evaluated if future investments in visitor services meet eligibility requirements.

Oil & Gas Leasing/Minerals: Lease fluid minerals with a CSU. Salable mineral development for administrative use only.

VRM: Class IV

Lands and Realty: ROW exclusion area

Special Recreation Permits (SRPs): SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate.

IMPLEMENTATION DECISIONS

Marketing: Provide maps and information at the field office. Directional signage necessary from Highway 59 and Bishop Road. Provide stewardship information to help preserve the special landscape character. Make available for outreach programs such as National Public Lands Day, etc.

Monitoring: Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows.

Management: Signs needed at key access points.

Administrative:

Travel Management: The area will be managed as limited to designated routes, with several routes designated. Identify routes to close and reclaim.

Agreements: State of Wyoming

Other administration: Prioritized for education efforts to mitigate recreational target shooting; recreational target shooting would be prohibited within any future developed recreation facilities.

T.8.2. Face of the Bighorns/North Fork Extensive Recreation Management Area

Supporting Information and Rationale

This ERMA is necessary to accommodate multiple use mandates through reduction of user conflicts primarily related to limited legal access and protection of high-quality hunting and wildlife viewing opportunities. The Face of the Bighorns/North Fork ERMA includes lands from the Poison Creek Trail area south along the Face of the Bighorns, the Horn, and the North Fork Wilderness Study Area (WSA). ERMA management will promote development of additional public access and sustain and enhance recreation amenities to accommodate visitor demand while honoring valid existing rights and preventing inadvertent trespass.

FACE OF THE BIGHORNS/NORTH FORK EXTENSIVE RECREATION MANAGEMENT AREA (ERMA) OBJECTIVES & DECISIONS

Objective Statement: By 2020, the Face of the Bighorns/North Fork ERMA will offer recreation opportunities, in a relatively unchanged physical recreation setting, that facilitate the visitor's freedom to participate in a variety of dispersed, nonmotorized/nonmechanized recreation activities.

Activities: Hiking, hunting, fishing, camping, wildlife and nature viewing.

Experiences: Developing skills and abilities, testing endurance, savoring the total sensory experience of a landscape.

Benefits: Greater sense of adventure, greater retention of distinctive natural landscape features; improved skills for outdoor enjoyment.

MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Recreation and Visitor Services Program: Camping allowed, subject to 14-day limit.

Oil & Gas Leasing/Minerals: North Fork WSA and lands with wilderness characteristics unit are recommended for withdrawal from mineral entry, closed to oil and gas leasing and closed to salable mineral development.

VRM: North Fork WSA is VRM Class I; remainder is Class II and III

Renewable Energy: The entire ERMA falls within a renewable energy exclusion area.

Lands and Realty: North Fork WSA and lands with wilderness characteristics unit are rights-of-way exclusion areas.

Special Recreation Permits (SRPs): SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate. Ensure that SRPs include sufficient mitigation to protect WSAs and lands with wilderness characteristics.

North Fork WSA and lands with wilderness characteristics unit are closed to motorized travel. Elsewhere, travel is limited to designated routes. Visual Resources Management (VRM) Class I, II, and III.

IMPLEMENTATION DECISIONS

Marketing: Provide maps and information at the field office. Directional signage necessary from Hazelton Road. Provide stewardship information to help preserve the special landscape character.

Monitoring: Vehicle and trail counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows.

Management: Signs needed at key access points.

Administrative:

Travel Management: North Fork WSA and lands with wilderness characteristics unit and a 500-foot buffer of the Poison Creek Trail are closed to motorized travel. Elsewhere, travel is limited to designated routes. A travel management plan will be developed to designate routes open for administrative or public use, to consider seasonal closures, and to identify routes to close and reclaim. North Fork WSA is closed to motorized use.

WSA: North Fork WSA is managed under Manual 6330 to prevent impairment of wilderness characteristics.

Agreements: State of Wyoming

Partners: Wyoming Game and Fish Department

Other administration: Recreational target shooting is prohibited within developed recreation sites. Currently, the Poison Creek trailhead is the only existing development.

T.8.3. Gardner Mountain Extensive Recreation Management Area

Supporting Information and Rationale

This ERMA is necessary to accommodate multiple use mandates through reduction of user conflicts primarily related to limited legal access and protection of high-quality hunting and wildlife viewing opportunities. The Gardner Mountain ERMA includes lands along and south of the Mayoworth-Slip Road and north of Barnum Mountain Road. The ERMA encompasses the Gardner Mountain Trail and the Gardner Mountain WSA. ERMA management will promote development of additional public access and sustain and enhance recreation amenities to accommodate visitor demand while honoring valid existing rights and preventing inadvertent trespass.

GARDNER MOUNTAIN EXTENSIVE RECREATION MANAGEMENT AREA (ERMA) OBJECTIVES & DECISIONS
Objective Statement: By 2020, the Gardner Mountain ERMA will offer recreation opportunities, in a relatively unchanged physical recreation setting, that facilitate the visitor's freedom to participate in a variety of dispersed, nonmotorized/nonmechanized recreation activities.
Activities: Hiking, hunting, fishing, camping, wildlife and nature viewing. *Experiences:* Developing skills and abilities, testing endurance, savoring the total sensory experience of a landscape. *Benefits:* Greater sense of adventure, greater retention of distinctive natural landscape features; improved skills for outdoor enjoyment.
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS
Recreation and Visitor Services Program: Campfires prohibited. Camping allowed, subject to 14-day limit. *Oil & Gas Leasing/Minerals:* Gardner Mountain WSA is recommended for withdrawal from mineral entry, closed to oil and gas leasing and closed to salable mineral development. *VRM:* Gardner Mountain WSA is VRM Class I; remainder is Class II and III *Renewable Energy:* The entire ERMA falls within a renewable energy exclusion area. *Lands and Realty:* Gardner Mountain WSA is a rights-of-way exclusion area. *Special Recreation Permits (SRPs):* SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate. Ensure that SRPs include sufficient mitigation to protect WSA.

IMPLEMENTATION DECISIONS
Marketing: Provide maps and information at the field office. Directional signage necessary from Hazelton, Slip, Mayoworth, Brock and Barnum Roads. Provide stewardship information to help preserve the special landscape character. **Monitoring:** Vehicle and trail counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows. **Management:** Signs needed at key access points. **Administrative:** *Travel Management:* Gardner Mountain WSA and a 500-foot buffer of the Gardner Mountain Trail is closed to motorized travel. Elsewhere, travel is limited to designated routes. A travel management plan will be developed to designate routes open for administrative or public use, to consider seasonal closures, and to identify routes to close and reclaim. *WSA:* Gardner Mountain WSA is managed under Manual 6330 to prevent impairment of wilderness characteristics. *Agreements:* State of Wyoming *Partners:* Wyoming Game and Fish Department *Other administration:* Recreational target shooting is prohibited within developed recreation sites. Currently, the Gardner Mountain trailhead is the only existing development.

T.8.4. Kaycee Stockrest Extensive Recreation Management Area

Supporting Information and Rationale

This ERMA is necessary to accommodate multiple use mandates through reduction of user conflicts primarily related to motorized use overlapping traditional livestock use. This ERMA is also necessary to accommodate local visitor demand for motorized recreational opportunities and recreational target shooting near the City of Kaycee; this demand has been identified by onsite evaluation and through visitor use data. The Kaycee Stockrest ERMA is located within 1.0 mile of the Kaycee city limits. ERMA management will sustain and enhance recreation amenities to accommodate the visitor demand while honoring valid existing rights and preventing inadvertent trespass.

KAYCEE STOCKREST EXTENSIVE RECREATION MANAGEMENT AREA (ERMA) OBJECTIVES & DECISIONS
Objective Statement: By 2018, the Kaycee Stockrest ERMA will provide recreational opportunities that meet the desires of local residents for nearby recreation opportunities while protecting human health and safety and minimizing conflicts between recreation and valid existing rights.
Activities: Off-highway vehicle use, hunting, camping and recreational target shooting. *Experiences:* Enjoying having easy access to natural landscapes, enjoying having access to close-to-home outdoor amenities. *Benefits:* Heightened sense of community sense of place, lifestyle improvement. Protection of both public and private land resources through boundary marking and active management.
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Recreation and Visitor Services Program: Campfires prohibited. Camping prohibited in 200 acres encompassing stockrest, except under stock trailing permit. Camping allowed on 2,685-acre parcel north of state section, subject to 14-day limit. Pursue agreement with City of Kaycee and local organizations to actively manage recreational target shooting.

VRM: Class II

Renewable Energy: The entire ERMA falls within a renewable energy exclusion area.

Special Recreation Permits (SRPs): SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate.

IMPLEMENTATION DECISIONS

Marketing: Provide maps and information at the field office. Directional signage necessary from Highway 59 and Bishop Road. Provide stewardship information to help preserve the special landscape character. Make available for outreach programs such as National Public Lands Day, etc.

Monitoring: Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows.

Management: Signs needed at key access points.

Administrative:

Travel Management: Travel is limited to designated routes. A travel management plan will be developed to designate routes open for administrative or public use, to consider seasonal closures, and to identify routes to close and reclaim.

Agreements: State of Wyoming

Partners: City of Kaycee, Johnson County

Other administration: Recreational target shooting is prohibited within developed recreation sites. Currently, no developments exist.

T.8.5. North Bighorns Extensive Recreation Management Area

Supporting Information and Rationale

This ERMA is necessary to accommodate multiple use mandates through reduction of user conflicts primarily related to limited legal access and protection of high-quality hunting and wildlife viewing opportunities. The North Bighorns ERMA includes lands along and south of the parcels in Sheridan County adjacent to the Bighorn National Forest.

ERMA management will promote coordination with the U.S. Forest Service and local organizations to meet community-driven recreation proposals and to facilitate seamless recreation opportunities.

NORTH BIGHORNS EXTENSIVE RECREATION MANAGEMENT AREA (ERMA) OBJECTIVES & DECISIONS

Objective Statement: By 2020, the North Bighorns ERMA will provide seamless opportunities for recreation in conjunction with the Bighorn National Forest.

Activities: Hiking, hunting, fishing, camping, wildlife and nature viewing. *Experiences:* Developing skills and abilities, testing endurance, savoring the total sensory experience of a landscape. *Benefits:* Greater sense of adventure, greater retention of distinctive natural landscape features; improved skills for outdoor enjoyment.
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS
Recreation and Visitor Services Program: Campfires prohibited. Camping allowed, subject to 14-day limit. Not a fee site; not currently suitable for Federal Lands Recreation Enhancement Act (FLREA). The site may be evaluated under FLREA if additional amenities are provided in the future. *VRM:* Class II *Renewable Energy:* The entire ERMA falls within a renewable energy exclusion area. *Special Recreation Permits (SRPs):* SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate.
IMPLEMENTATION DECISIONS
Marketing: Provide maps and information at the field office. Directional signage necessary from Hazelton Road. Provide stewardship information to help preserve the special landscape character. **Monitoring:** Vehicle and trail counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows. **Management:** Signs needed at key access points. **Administrative:** *Travel Management:* Travel is limited to designated routes. A travel management plan will be developed to designate routes open for administrative or public use, to consider seasonal closures, and to identify routes to close and reclaim. *Agreements:* State of Wyoming *Partners:* U.S. Forest Service Bighorn National Forest, Wyoming Game and Fish Department *Other administration:* Recreational target shooting would prohibited within any future developed recreation sites. Currently, no development exists.

T.8.6. Powder River Basin Extensive Recreation Management Area

Supporting Information and Rationale

This ERMA is necessary to accommodate multiple use mandates through reduction of user conflicts primarily related to limited legal access and protection of high-quality hunting and wildlife viewing opportunities. ERMA management will promote development of additional public access and sustain and enhance recreation amenities to accommodate visitor demand while honoring valid existing rights and preventing inadvertent trespass.

POWDER RIVER BASIN EXTENSIVE RECREATION MANAGEMENT AREA (ERMA) OBJECTIVES & DECISIONS

Objective Statement: By 2018, the Powder River Basin ERMA will provide opportunities for recreationists to engage in hunting, camping and other dispersed recreational opportunities on accessible public lands while preventing inadvertent trespass onto adjacent private lands.

Activities: Hunting, hiking, camping, and nature viewing.

Experiences: Enjoying having access to close-to-home outdoor amenities, greater understanding of the importance of recreation and tourism in our community, improved understanding of this/our community's dependence and impact on public lands.

Benefits: Heightened sense of community sense of place, lifestyle improvement. Protection of both public and private land resources through boundary marking and active management.

MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Recreation and Visitor Services Program: Campfires subject to Wyoming Interagency Fire Restrictions. Camping allowed, subject to 14-day limit.

Oil & Gas Leasing/Minerals: Fortification Creek WSA is recommended for withdrawal from mineral entry, closed to oil and gas leasing and closed to salable mineral development.

VRM: Fortification Creek WSA is VRM Class I; remainder is Class II, III, and IV

Renewable Energy: The majority of the ERMA falls within a renewable energy exclusion or avoidance area.

Lands and Realty: Fortification Creek WSA is a rights-of-way exclusion area.

Special Recreation Permits (SRPs): SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate. Ensure that SRPs include sufficient mitigation to protect WSA.

IMPLEMENTATION DECISIONS

Marketing: Provide maps and information at the field office. Directional signage necessary from exits along I-90. Provide stewardship information to help preserve the special landscape character.

Monitoring: Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows.

Management: Signs needed at key access points.

Administrative:

Travel Management: Fortification Creek WSA is closed to motorized travel. Elsewhere, travel is limited to designated routes. A travel management plan will be developed to designate routes open for administrative or public use, to consider seasonal closures, and to identify routes to close and reclaim.

ACEC: Fortification Creek ACEC measures to protect elk habitat may include restrictions on access and travel management.

WSA: Fortification Creek WSA is managed under Manual 6330 to prevent impairment of wilderness characteristics.

Agreements: State of Wyoming

Partners: Wyoming Game and Fish Department

Other administration: Recreational target shooting would be prohibited within any future developed recreation sites. Currently, no developments exist.

T.8.7. South Bighorns Extensive Recreation Management Area

Supporting Information and Rationale

This ERMA is necessary to accommodate multiple use mandates through reduction of user conflicts primarily related to limited legal access and protection of high-quality hunting and wildlife viewing opportunities. The South Bighorns ERMA includes lands in southwestern Johnson County, south of Barnum Mountain Road, and generally west of Bar C Road that are not part of the Middle Fork Powder River or Hole-in-the-Wall SRMAs.

ERMA management will promote coordination with the Worland and Casper Field Offices, Wyoming Game and Fish Department, State of Wyoming, and local organizations to meet community-driven recreation proposals and to facilitate seamless recreation opportunities. ERMA management will promote development of additional public access and sustain and enhance recreation amenities to accommodate visitor demand while honoring valid existing rights and preventing inadvertent trespass.

SOUTH BIGHORNS EXTENSIVE RECREATION MANAGEMENT AREA (ERMA) OBJECTIVES & DECISIONS
Objective Statement: By 2018, the South Bighorns ERMA will offer seamless recreation opportunities, in a relatively unchanged physical recreation setting, that facilitate the visitor's freedom to participate in a variety of dispersed, recreation activities. Motorized access across the region will be accommodated through limited routes and public motorized access between Outlaw Cave, Hole-in-the-Wall, and Hazelton Road will be pursued.
Activities: Hiking, hunting, fishing, camping, wildlife and nature viewing. *Experiences:* Developing skills and abilities, testing endurance, savoring the total sensory experience of a landscape. *Benefits:* Greater sense of adventure, greater retention of distinctive natural landscape features; improved skills for outdoor enjoyment.
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS
Recreation and Visitor Services Program: Camping allowed, subject to 14-day limit. Not a fee site; not currently suitable for Federal Lands Recreation Enhancement Act (FLREA). The site may be evaluated under FLREA if additional amenities are provided in the future. *VRM:* Class II and III *Renewable Energy:* The entire ERMA falls within a renewable energy exclusion area. *Special Recreation Permits (SRPs):* SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate.

IMPLEMENTATION DECISIONS
Marketing: Provide maps and information at the field office. Directional signage necessary from Hazelton Road. Provide stewardship information to help preserve the special landscape character. **Monitoring:** Vehicle and trail counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows. **Management:** Signs needed at key access points. **Administrative:** *Travel Management:* Travel is limited to designated routes. A travel management plan will be developed to designate routes open for administrative or public use, to consider seasonal closures, and to identify routes to close and reclaim. *Wild and Scenic Rivers:* The canyon within 0.25 mile of Middle Fork Powder River is managed under Manual 6400 – Wild and Scenic Rivers to protect outstandingly remarkable values. *Agreements:* State of Wyoming *Partners:* Wyoming Game and Fish Department *Other administration:* Recreational target shooting would be prohibited within any future developed recreation sites.

T.8.8. Walk-in Area Extensive Recreation Management Area

Supporting Information and Rationale

This ERMA is necessary to accommodate multiple use mandates through reduction of user conflicts primarily related to limited legal access and protection of high-quality hunting and wildlife viewing opportunities. The Walk-in Area ERMA includes BLM-administered lands adjacent to Walk-in Areas with agreements that are negotiated between Wyoming Game and Fish Department (WGFD) and private landowners.

WGFD manages the Private Lands Public Wildlife Access program to improve public access for hunting and fishing opportunities. Walk-in agreements are negotiated between WGFD and private landowners for a specific period of time, usually several years, and thus the status of an access areas can change during the life of this plan. BLM-administered lands adjacent to Walk-in Areas provide additional access and hunting and fishing opportunities for recreationists. While the WGFD and the adjacent private landowner have authority over any lands enrolled in the program, the BLM can support the objectives of the Private Lands Public Wildlife Access program through collaborative management.

Several parcels adjacent to current or historic Walk-in Areas overlap portions of other SRMAs and ERMAs. The objectives of the Walk-in Area ERMA apply to any BLM-administered lands that are adjacent to currently enrolled lands in the Private Lands Public Wildlife Access program and may be concurrently applied to parcels in an ERMA or SRMA.

ERMA management will promote coordination with the WGFD, State of Wyoming, and private landowners to promote public access to public lands and facilitate seamless recreation opportunities. ERMA management will promote development of additional public access and sustain and enhance recreation amenities to accommodate visitor demand while honoring valid existing rights and preventing inadvertent trespass.

WALK-IN AREA EXTENSIVE RECREATION MANAGEMENT AREA (ERMA) OBJECTIVES & DECISIONS

Objective Statement: By 2018, Bureau of Land Management-administered lands adjacent to Wyoming Game and Fish Department Walk-In Areas will provide seamless opportunities for the nonmotorized recreation, specifically hunting and fishing. Travel management, camping restrictions and fire restrictions may be negotiated to support additional public access to public lands through the Private Lands Public Wildlife Access program objectives.

Activities: Hunting, fishing, camping, wildlife and nature viewing.

Experiences: Greater community ownership and stewardship of recreation, and natural resources, improved understanding of how this community's rural-urban interface impacts its quality of life, improved understanding of this/our community's dependence and impact on public lands.

Benefits: Greater sense of adventure, greater retention of distinctive natural landscape features; improved skills for outdoor enjoyment.

MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Recreation and Visitor Services Program: Campfires may be prohibited to facilitate negotiations with private landowners. Wyoming Interagency Fire Restrictions would be posted at access points. Camping may be allowed, subject to 14-day limit. Restrictions on camping would be analyzed on a case-by-case basis and permanent closures would require a land use plan amendment.

VRM: Currently, Class II-IV

Special Recreation Permits (SRPs): SRPs may be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate.

IMPLEMENTATION DECISIONS

Marketing: Provide maps and information at the field office. Provide stewardship information related to outdoor ethics.

Monitoring: Vehicle and trail counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows.

Management: Signs needed at key access points.

Administrative:

Travel Management: Travel is limited to designated routes. A travel management plan will be developed to designate routes open for administrative or public use, to consider seasonal closures, and to identify routes to close and reclaim.

Agreements: State of Wyoming

Partners: Wyoming Game and Fish Department

Other administration: Recreational target shooting would be prohibited within any future developed recreation sites.

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Appendix U. Economic Impact Analysis Methodology

This appendix describes the methods and data that underlie the economic impact modeling analysis. Input-output models such as the Impact Analysis for Planning (IMPLAN) model, an economic impact analysis model, provide a quantitative representation of the production relationships between individual economic sectors. Thus, the economic modeling analysis uses information about physical production quantities and the prices and costs for goods and services. The inputs required to run the IMPLAN model are described in the following narrative and tables. The resulting estimates from the IMPLAN model, by alternative, can be found in the *Economic Conditions* section in Chapter 4. The first section of this appendix describes general aspects of the IMPLAN model and how it was used to estimate economic impacts. The remaining sections provide additional detailed data used in the analysis for oil and gas, livestock grazing, and recreation.

U.1. The IMPLAN Model

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 (also called the "multiplier effect") of changes in economic sectors that may not be directly impacted by management actions, but are linked to industries that are directly impacted. In IMPLAN, these ripple effects are termed indirect impacts (for changes in industries that sell inputs to the industries that are directly impacted) and induced impacts (for changes in household spending as household income increases or decreases due to the changes in production).

This analysis used IMPLAN 2010; prior to running the model, all cost and price data were converted to a consistent dollar year using regional and sector-specific adjustment factors from the IMPLAN model. The values in this appendix are expressed in year 2011 dollars so that the earnings and employment estimates can be easily compared to the earnings and employment data from the Bureau of Economic Analysis (see Chapter 3). IMPLAN defines employment as the annual average of monthly jobs in an industry. A job can be either full-time or part-time. This definition is equivalent to that used by the Bureau of Economic Analysis (note that this would not typically correspond to full time equivalents).

The current IMPLAN model has 440 economic sectors, of which 184 are represented in the three planning area counties. This analysis involved direct changes in economic activity for 33 IMPLAN economic sectors, as well as changes in all other related sectors due to the ripple effect. The IMPLAN production coefficients were modified to reflect the interaction of producing sectors in the planning area. As a result, the calibrated model generates multipliers and subsequent impacts that more accurately reflect the interaction between and among the sectors in the planning area compared to a model using unadjusted national coefficients. For instance, worker productivity in oil and gas production is higher in Wyoming than the national average. Key variables used in the IMPLAN model were filled in using data specific to Wyoming, including employment estimates, labor earnings, and total industry output.

U.2. Oil and Gas

The economic impacts analysis for oil and gas reflects drilling, completion, and production activities. The number of wells drilled and completed is based on the Reasonable Foreseeable Development (RFD) Scenario for Oil and Gas (Stilwell et al. 2012) and the constraints applied under each alternative. The *Leasable Minerals - Fluids* section in Chapter 4, describes the methods and assumptions used to develop the number of wells drilled, completed and under production under each alternative. Total well numbers for each alternative are presented in Table U.1, "Oil and Gas Well Numbers (BLM-Administered Surface)" (p. 2590). Table U.2, "Projected Oil and Gas Production from New Wells (Federal Surface)" (p. 2591) presents the projected quantity of oil and gas produced on federal surface, and Table U.3, "Projected Oil and Gas Production from New Wells (Federal, State, and Fee Surface)" (p. 2591) presents the projected quantity of oil and gas produced from federal, state, and private (fee) surface.

Table U.1. Oil and Gas Well Numbers (BLM-Administered Surface)

Item	Conventional Infill (Vertical)	Coalbed Natural Gas	Horizontal	Total
Federal Surface				
Alternative A – Wells Drilled	366	903	1,462	2,731
Alternative A – Wells Completed	275	895	1,462	2,632
Alternative B – Wells Drilled	1	101	6	108
Alternative B – Wells Completed	1	100	6	107
Alternative C – Wells Drilled	398	5,280	1,592	7,270
Alternative C – Wells Completed	299	5,234	1,592	7,125
Alternative D – Wells Drilled	355	2,721	1,418	4,494
Alternative D – Wells Completed	266	2,698	1,418	4,382
Federal, State, and Fee Surface				
Alternative A – Wells Drilled	741	5,890	2,962	9,593
Alternative A – Wells Completed	556	5,839	2,962	9,357
Alternative B – Wells Drilled	376	5,088	1,506	6,970
Alternative B – Wells Completed	282	5,044	1,506	6,832
Alternative C – Wells Drilled	773	10,267	3,092	14,132
Alternative C – Wells Completed	580	10,178	3,092	13,850
Alternative D – Wells Drilled	730	7,708	2,918	11,356
Alternative D – Wells Completed	548	7,642	2,918	11,108
Source: Stilwell et al. 2012; Appendix G (p. 1937) BLM Bureau of Land Management				

Table U.2. Projected Oil and Gas Production from New Wells (Federal Surface)

Year	Alternative A		Alternative B		Alternative C		Alternative D	
	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)
2009	0.8	0.2	0.0	0.0	2.2	0.2	1.4	0.2
2010	2.5	0.5	0.1	0.0	8.9	0.5	5.1	0.5
2011	5.8	0.9	0.4	0.0	23.6	1.0	13.0	0.9
2012	8.8	1.1	0.7	0.0	39.2	1.2	21.3	1.1
2013	9.5	1.1	0.8	0.0	44.7	1.2	24.0	1.0
2014	10.9	1.5	0.8	0.0	46.8	1.7	25.6	1.5
2015	11.4	1.8	0.8	0.0	47.7	1.9	26.2	1.7
2016	13.4	2.4	0.9	0.0	52.2	2.6	29.2	2.3
2017	14.1	2.4	1.0	0.0	56.4	2.6	31.3	2.3
2018	16.9	3.1	1.1	0.0	64.2	3.4	36.0	3.0
2019	19.0	3.5	1.3	0.0	72.8	3.8	40.8	3.4
2020	21.7	4.0	1.5	0.0	83.9	4.3	47.0	3.8
2021	24.6	4.2	1.7	0.0	98.1	4.6	54.5	4.1
2022	28.4	4.8	2.0	0.0	113.2	5.3	62.9	4.7
2023	31.4	5.2	2.2	0.0	126.8	5.7	70.3	5.1
2024	34.5	5.8	2.4	0.0	138.8	6.3	77.0	5.6
2025	36.1	6.0	2.6	0.0	145.9	6.5	80.8	5.8
2026	37.8	6.5	2.6	0.0	150.2	7.1	83.5	6.3
2027	37.5	6.5	2.6	0.0	148.6	7.1	82.7	6.3
2028	37.1	6.9	2.4	0.0	142.0	7.5	79.6	6.7

Source: Stilwell et al. 2012; BLM 2013h; Appendix G (p. 1937). Includes coalbed and conventional gas.

BCF billion cubic feet
MMBO million barrels of oil

Table U.3. Projected Oil and Gas Production from New Wells (Federal, State, and Fee Surface)

Year	Alternative A		Alternative B		Alternative C		Alternative D	
	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)
2009	2.9	0.4	2.1	0.2	4.3	0.4	3.4	0.4
2010	10.9	1.0	8.5	0.5	17.3	1.0	13.5	1.0
2011	28.0	1.8	22.7	0.9	45.8	1.9	35.3	1.8
2012	45.9	2.3	37.8	1.1	76.3	2.4	58.4	2.2
2013	51.7	2.2	43.0	1.1	86.8	2.3	66.2	2.1
2014	55.1	3.1	45.1	1.6	91.1	3.3	69.8	3.1
2015	56.5	3.6	45.9	1.8	92.8	3.7	71.3	3.5
2016	62.7	4.8	50.2	2.4	101.5	5.0	78.5	4.7
2017	67.3	4.9	54.2	2.5	109.6	5.1	84.5	4.8
2018	77.4	6.3	61.7	3.2	124.7	6.6	96.6	6.2
2019	87.7	7.1	70.0	3.6	141.5	7.4	109.5	7.0
2020	101.0	8.0	80.7	4.1	163.2	8.4	126.2	7.9
2021	117.3	8.5	94.4	4.3	190.8	8.9	147.2	8.4
2022	135.3	9.8	108.9	5.0	220.1	10.2	169.8	9.7
2023	151.2	10.6	122.0	5.4	246.5	11.1	190.0	10.4
2024	165.6	11.7	133.5	6.0	269.8	12.2	208.0	11.6
2025	173.8	12.2	140.3	6.2	283.6	12.7	218.6	12.0
2026	179.5	13.1	144.4	6.7	291.9	13.7	225.3	12.9
2027	177.8	13.2	142.9	6.7	289.0	13.8	223.0	13.0

Year	Alternative A		Alternative B		Alternative C		Alternative D	
	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)
2028	171.2	14.0	136.6	7.1	276.1	14.6	213.8	13.8

Source: Stilwell et al. 2012; BLM 2013h; Appendix G (p. 1937). Includes coalbed and conventional gas.

BCF billion cubic feet
MMBO million barrels of oil

The costs of drilling and completing wells and producing oil and gas are also relevant to the economic impact analysis. Table U.4, "Assumptions for Analysis of Economic Impacts for Oil and Gas Well Drilling and Completion According to Well Type" (p. 2592) provides a summary of the costs of drilling, completion, and production for each well type (conventional infill, horizontal, and coalbed natural gas [CBNG]) used for the economic analysis.

Table U.4. Assumptions for Analysis of Economic Impacts for Oil and Gas Well Drilling and Completion According to Well Type

Assumption	Well Type		
	Conventional Infill	Horizontal	Coalbed Natural Gas
Drilling Impacts			
Drilling Cost ($/well)	$957,320	$2,271,725	$102,100
Local Drilling Costs[1]	88%	50%	84%
Local Direct Impact ($/well)	$841,881	$1,135,863	$85,424
Local Total Impact ($/well)[2]	$1,073,510	$1,431,518	$108,357
Multiplier (total impact/direct impact)	1.28	1.26	1.27
Completion Impacts			
Completion Cost ($/well)	$797,303	$6,815,175	$204,200
Local Completion Costs[1]	61%	50%	55%
Local Direct Impact ($/well)	$489,324	$3,407,588	$112,341
Local Total Impact ($/well)[2]	$646,331	$4,526,294	$146,408
Multiplier (total impact/direct impact)	1.32	1.33	1.30

Source: Stilwell et al. 2012; BLM 2013i; Taylor 2013. Data are in 2011 dollars and are based on Authorizations For Expenditure provided by exploration and development companies.
[1]The local cost shares were based on the percent of total drilling or completion costs that would be spent on goods and services purchased from the local economy.
[2] Total impacts estimated using Impact Analysis for Planning (IMPLAN) include direct, indirect, and induced impacts.

$ U.S. dollar

Table U.5, "Assumptions for Analysis of Economic Impacts on Output for Oil and Gas Production" (p. 2592) provides the assumptions used to determine the economic impact associated with the production of oil and gas. For the analysis, the Bureau of Land Management (BLM) estimated a production cost (for gas) of $1.48 per thousand cubic feet (mcf), based on data from the Energy Information Administration (Taylor 2013).

Table U.5. Assumptions for Analysis of Economic Impacts on Output for Oil and Gas Production

Economic Impact	Oil Production (per million barrels)[2]	Gas Production (per billion cubic feet)[3]
Direct Economic Impact[1]	$86,785,000	$4,186,100
Indirect Economic Impact[4]	$7,439,499	$358,846

Economic Impact	Oil Production (per million barrels)[2]	Gas Production (per billion cubic feet)[3]
Induced Economic Impact[5]	$2,363,153	$113,987
Total Economic Impact	$96,587,652	$4,658,934
Multiplier (total impact/direct impact)	1.11	1.11

Note: All dollar values are in year 2011 dollars.
[1]Direct economic impact is the market value of output.
[2]Based on an oil price of $86.785 per barrel, which is an average of the prices for 2012-2018 projected by the Wyoming Consensus Revenue Estimating Group (2013) and adjusted to 2011 dollars.
[3]Based on a gas price of $4.186 per mcf, which is an average of the prices for 2012-2018 projected by the Wyoming Consensus Revenue Estimating Group (2013) and adjusted to 2011 dollars.
[4]Indirect impacts from IMPLAN reflect increased demand in sectors that directly or indirectly provide supplies to the oil and gas industry.
[5]Induced impacts from IMPLAN reflect increased demand in the consumer and government sectors.

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The forecasted number of wells and production used for estimating employment impacts is the same as for estimating impacts on labor earnings and output. Table U.6, "Assumptions for Employment Impact Analysis for Oil and Gas Well Drilling and Completion According to Well Type" (p. 2593) shows the direct and total employment impacts attributable to drilling and completion.

Table U.6. Assumptions for Employment Impact Analysis for Oil and Gas Well Drilling and Completion According to Well Type

Employment Impact	Well Type		
	Vertical	Horizontal	Coalbed Natural Gas
Drilling Impacts			
Direct Employment (jobs/well)	4.2	5.8	0.6
Total Employment Impact (jobs/well)	6.2	8.5	0.8
Multiplier (Total Impact/Direct Impact)	1.48	1.47	1.41
Average Earnings per Job (2011 dollars)	$63,318	$64,983	$52,278
Completion Impacts			
Direct Employment (jobs/well)	2.9	20.6	0.7
Total Employment Impact (jobs/well)	4.3	30.72	1.0
Multiplier (Total Impact/Direct Impact)	1.47	1.49	1.47
Average Earnings per Job (2011 dollars)	$59,143	$58,446	$53,674

Source: Taylor 2013
Note: Direct and total employment impact and average earnings per job are calculated using Impact Analysis for Planning.

Table U.7, "Assumptions for Employment Impact Analysis for Oil and Gas Production" (p. 2594) shows the direct and total employment impacts associated with production.

Table U.7. Assumptions for Employment Impact Analysis for Oil and Gas Production

Employment Impact (annual number of jobs)	Oil Production (per million barrels)	Gas Production (per billion cubic feet)
Direct Employment	19.4	0.1
Indirect Employment	32.7	0.2
Induced Employment	16.3	0.1
Total Employment	68.4	0.4
Multiplier (Total Impact/Direct Impact)	3.53	3.53
Average Earnings per Job (2011 dollars)	$67,276	$67,276
Source: Taylor 2013 Note: Direct, indirect, and induced employment impact and average earnings per job are calculated using Impact Analysis for Planning.		

The analysis of potential changes in tax revenues is based on tax rates of 12.5 percent of taxable value for federal mineral royalties, 6 percent of taxable value for state severance taxes (Wyoming Department of Revenue 2001), and 6.5 percent of taxable value for local ad valorem production taxes (based on recent average tax rates for the counties of Campbell [6.0%], Johnson [7.0%], and Sheridan [6.6%]) (Wyoming Department of Revenue 2009; Wyoming Department of Revenue 2011). Taxable value refers to value of sales minus allowable deductions, including certain costs of production and transportation. For purposes of estimating tax revenues, taxable value was estimated based on the average taxable value per unit sold from the counties in the planning area for production year 2010–2011 using data from the Wyoming Department of Revenue (2011). Taxable value was estimated as $61.60 per barrel for oil, and $3.02 per mcf for natural gas (2011 dollars).

U.3. Livestock Grazing

Economic impacts due to changes in livestock grazing are a function of the amount of forage available and the economic value of the forage. For livestock grazing, long-term surface disturbance from actions listed in Appendix G (p. 1937) may affect available animal unit months (AUMs). In addition, land disposal actions may have economic impacts; however, those impacts were not analyzed quantitatively because it is difficult to predict the net change in AUMs as a result of land disposal. Subsequent landowners may continue to graze the land, leaving overall livestock production and output in the region unaffected.

The economic analysis of livestock grazing impacts is based on authorized use. The BLM's data indicate that authorized use in the Buffalo Field Office is 106,078 AUMs, which is the same as active use. (However, note that in some field offices, active and authorized use figures are not identical.) Whereas the 106,203 permitted AUMs include active and suspended non-use AUMs, active AUMs exclude suspended non-use AUMs. Authorized use represents AUMs billed for and paid for each year for a permit or lease. These AUMs are not the same as actual use AUMs, and may diverge from actual use AUMs depending on individual and climatic circumstances in a given year. Actual use represents the AUMs physically used on the ground. Actual use may be less than or equal to authorized use, but authorized use provides an upper bound for the actual use in a given year. The BLM adjusts authorized use on an annual basis to account for the forage value of the land in a given year, based on climatic conditions (e.g., drought), as well as taking into account the needs of the land and the ranch operators.

Reductions in land available for livestock grazing (e.g., via long-term surface disturbance) are based on active use AUMs, while financial conditions on a given ranch operation are determined

by actual use (i.e., the actual forage value of the land that is used for livestock) and authorized use (e.g., bank loans that are based on the available forage value of federal leases held by the ranch operator). Thus, for this study, authorized use is an appropriate baseline from which to measure reductions in available AUMs due to surface disturbance or restriction on grazing land. If reductions were measured from a higher baseline, such as permitted use, economic impacts would be overstated (although in this case the difference would be minimal, as the permitted use is essentially equal to authorized use).

Table U.8, "Estimated Forage Availability (Animal Unit Months)" (p. 2595) provides a summary of initial AUMs and total AUMs that the BLM projects would be lost by 2028 due to surface-disturbing activities or restrictions on grazing on BLM-administered lands. Projected losses of AUMs are BLM's estimates, given the grazing restrictions imposed under each alternative. They reflect long-term expectations of losses that would occur over the years, not losses that would be felt concurrent with the signing of the Record of Decision. Based on current allocations of AUMs to cattle and sheep, 92 percent of the AUM reduction is allocated to cattle and the remainder is allocated to sheep, for the purpose of estimating changes in output and employment. (There are also some AUMs allocated to horse and yak grazing, but these comprise two percent and less than one percent, respectively. These AUMs are included in the analysis, but the assumption is that their economic value is comparable to that of cattle and sheep grazing.) Acres of surface disturbance were converted to AUMs using a conversion factor of 6 acres per AUM (BLM 2010g).

Table U.8. Estimated Forage Availability (Animal Unit Months)

Item	Alternative A	Alternative B	Alternative C	Alternative D
Initial AUMs (authorized use)	106,078	106,078	106,078	106,078
AUMs lost due to surface-disturbing activities (long-term disturbance) and restrictions on grazing	8,352	61,540	11,526	12,241
AUMs lost due to surface-disturbing activities (estimated annual) and restrictions on grazing	418	3,077	576	612
Net AUMs in 2028 (authorized use)	97,726	44,538	94,552	93,837
Source: BLM 2010g; BLM 2012l AUM Animal Unit Month				

Due to price fluctuations, average per-AUM values for cattle and sheep are based on the 2002 to 2011 average value of production estimates from the U.S. Department of Agriculture, adjusted to 2011 dollars (Taylor 2013). The value for cattle is $49.67 per AUM and the value for sheep is $59.23 per AUM. Including indirect and induced impacts, the value of one AUM for cattle is $92.64 and for sheep $121.30. Table U.9, "Assumptions for Analysis of Impacts on Output for Livestock Grazing" (p. 2595) shows the economic impact assumptions for cattle and sheep. The direct economic impact is the estimated change in livestock output per AUM; IMPLAN generates the indirect and induced impacts.

Table U.9. Assumptions for Analysis of Impacts on Output for Livestock Grazing

Economic Impact	Cattle	Sheep
Direct Economic Impact ($/AUM)	$49.67	$59.23
Indirect Economic Impact ($/AUM)[1]	$28.14	$46.91
Induced Economic Impact ($/AUM)[2]	$14.83	$15.17

Economic Impact	Cattle	Sheep
Total Economic Impact ($/AUM)	$92.64	$121.30
Multiplier (Total Impact/Direct Impact)	1.87	2.05

Source: Taylor 2013

Note: All dollar values are in 2011 dollars.
[1]Indirect impacts reflect increased demand in sectors that directly or indirectly provide supplies to the livestock industry.
[2]Induced impacts reflect increased demand in the consumer and government sectors.

$ U.S. dollar
AUM Animal Unit Month

Table U.10, "Assumptions for Analysis of Employment Impacts for Livestock Grazing" (p. 2596) provides a summary of the employment impacts assumed according to unit changes in livestock AUMs.

Table U.10. Assumptions for Analysis of Employment Impacts for Livestock Grazing

Employment Impact	Cattle	Sheep
Direct Employment (Jobs/1,000 AUMs)	0.558	0.980
Indirect Employment (Jobs/1,000 AUMs)	0.306	0.748
Induced Employment (Jobs/1,000 AUMs)	0.141	0.139
Total Employment (Jobs/1,000 AUMs)	1.006	1.868
Multiplier (Total Impact/Direct Impact)	1.73	1.72
Average Earnings per Job (2011 dollars)	$32,747	$18,976

Source: Taylor 2013

Note: Direct, indirect, and induced employment impacts and average earnings per job are calculated using Impact Analysis for Planning (IMPLAN).

AUM Animal Unit Month

U.4. Recreation

The analysis of economic impacts considers only recreation expenditures of nonresidents of the planning area. This is based on the assumption that expenditures of residents would occur in the region regardless of the BLM's actions that impact recreational opportunities; however, changes in nonresident recreation patterns would alter the amount of money entering the local region.

Economic impacts from recreation are a function of recreation visitor days (RVDs) and expenditures per day. Future RVDs were estimated based on current RVDs, recent growth rates, and projected trends. Estimates of future RVDs were based on the professional judgment of BLM staff, as well as a United States Forest Service (USFS) study that provides forecasts of recreation activity for the Rocky Mountain region (Bowker et al. 1999) and contacts with neighboring BLM field offices. Table U.11, "Projected Growth Rates for Nonresident Recreation Visitor Days" (p. 2597) provides a summary of estimated annual growth rates.

Table U.11. Projected Growth Rates for Nonresident Recreation Visitor Days

Item	OHV	Hunting	Fishing	Other Dispersed
2009 RVDs	487	2,081	290	2,739
2013 RVDs	507	2,140	296	2,919
2018 RVDs	533	2,216	303	3,160
2023 RVDs	560	2,294	311	3,421
2028 RVDs	588	2,376	319	3,703
Projected Annual Growth Rate	1.0%	0.7%	0.5%	1.6%

Source: BLM 2010f

OHV Off-highway vehicle
RVD Recreation visitor day

The estimates for average expenditure per visitor day, in 2011 dollars, are $93.32 for fishing (WGFD 2008a; USFWS 2008a), $143.90 for hunting (Responsive Management 2004), $57.58 for OHV use (Foulke et al. 2006), and $35.80 for other dispersed recreation (Stynes and White 2005). Table U.12, "Assumptions for Analysis of Impacts on Output for Recreation Activities" (p. 2597) shows the direct, indirect, and induced output per RVD for each recreation activity.

Table U.12. Assumptions for Analysis of Impacts on Output for Recreation Activities

Economic Impact	OHV (per RVD)	Hunting (per RVD)	Fishing (per RVD)	Other Dispersed (per RVD)
Direct Economic Impact[1]	$57.58	$143.90	$93.32	$35.80
Indirect Economic Impact[2]	$5.79	$24.73	$10.16	$4.31
Induced Economic Impact[3]	$6.60	$23.54	$10.21	$3.84
Total Economic Impact	$69.97	$192.17	$113.69	$43.94
Multiplier (total impact/direct impact)	1.22	1.34	1.22	1.23

Sources: WGFD 2008a; USFWS 2008a; Responsive Management 2004; Foulke et al. 2006; Stynes and White 2005; Taylor 2010; Taylor 2013
Note: Detail may not add to total due to rounding.
[1]Direct economic impact is the average expenditure per visitor day.
[2]Indirect impacts from IMPLAN reflect increased demand in sectors that directly or indirectly provide support for the recreation industry.
[3]Induced impacts from IMPLAN reflect increased demand in the consumer and government sectors.

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OHV Off-highway vehicle
RVD Recreation visitor day

Table U.13, "Assumptions for Employment Impact Analysis for Recreation Activities" (p. 2598) provides a summary of employment impacts assumed according to unit changes in RVDs.

Table U.13. Assumptions for Employment Impact Analysis for Recreation Activities

Employment Impact (annual number of jobs)	OHV (per 1,000 RVDs)	Hunting (per 1,000 RVDs)	Fishing (per 1,000 RVDs)	Other Dispersed (per 1,000 RVDs)
Direct Employment	0.54	1.65	0.92	0.36
Indirect Employment	0.06	0.24	0.09	0.04
Induced Employment	0.06	0.21	0.09	0.04
Total Employment	0.65	2.10	1.11	0.44
Multiplier (Total Impact/Direct Impact)	1.22	1.27	1.20	1.20
Average Earnings per Job (2011 dollars)	$26,332	$25,097	$23,183	$22,883

Source: Taylor 2013

Note: Direct, indirect, and induced employment impact and average earnings per job are calculated using Impact Analysis for Planning (IMPLAN).

OHV Off-highway vehicle
RVD Recreation visitor day

Appendix V. Oil and Gas Operations

Note: This appendix was added following the release of the Buffalo Draft Resource Management Plan (RMP) and Environmental Impact Statement (EIS).

The purpose of this appendix is to summarize the Bureau of Land Management's (BLM) procedures for considering proposals to conduct exploration, leasing and production operations for federal oil and gas. This appendix is provided for information purposes only, and is not necessarily a complete statement of rights, obligations, or processes. This appendix is not a part of the BLM's land use plan decision for the RMP. Any conflict with any statute or regulation is unintentional. In the event of a conflict, the statute or regulation controls. Federal oil and gas lessees and operators, and private surface owners, are advised to confer with the BLM at the time an action is proposed for BLM's consideration, in order to obtain information about the current regulations and policies that may apply to the proposal. Nothing in this appendix affects the authority of any Tribe or of the Bureau of Indian Affairs in any way. This RMP applies to federal lands as defined by the Federal Land Policy and Management Act (FLPMA), and does not apply to lands held in trust for any Tribe or for any individual Indian or Indians.

V.1. Geophysical Exploration

Oil and gas can be discovered by direct or indirect exploration methods, such as the mapping of rock outcrops, seeps, borehole data, and remote sensing data. In many cases, indirect methods, such as seismic, gravity, and magnetic surveys are required to delineate subsurface features that could contain oil and gas. Geophysical exploration could provide information that increases the chances of drilling a discovery well, as well as information that could discourage drilling and the associated surface disturbance. More sophisticated geophysical techniques, such as three-dimensional seismic surveys, could supply enough information to model a reservoir and optimize drilling to prevent excess wells and the associated surface disturbance. Economics and past information also play a role in determining the method used.

V.1.1. Seismic Reflection Surveys

Seismic prospecting is the best and most popular indirect method for locating subsurface structures and stratigraphy that might contain hydrocarbons. Seismic energy (shock waves) is induced into the Earth using one of several methods. As these waves travel downward and outward, they encounter various rock strata, each having a different seismic velocity characteristic. As the wave energy encounters the interface between rock layers, where the lower layer is of lower seismic velocity, some of the seismic energy is reflected upward. Sensing devices, commonly called geophones, are placed on the surface to detect these reflections. The geophones are connected to a recording truck that stores the data. The time required for the shock waves to travel from the shot point down to a given reflector and back to the geophone is related to depth, and this value is mapped to give an underground picture of the geologic structure.

There are many methods available today that an explorationist can use to induce the initial seismic energy into the Earth. All methods require preliminary surveying and laying of geophones. The thumper and vibrator methods pound or vibrate the ground to create a shock wave. Usually large trucks are used, each equipped with vibrator pads (about 4 feet square). The pads are lowered to the ground, and vibrators on all trucks are triggered electronically from the recording truck. Information is recorded, and then the trucks move forward a short distance, and the process

is repeated. Less than 50 square feet of surface area is required to operate the equipment at each test site. The trucks are equipped with large flotation type tires, which reduce the impact of driving over undisturbed terrain.

The drilling method uses vehicle-mounted or heli-portable drills that drill small-diameter holes to depths down to 100 feet. Depending on type of survey, over 100 holes are drilled per mile of line. Usually, a 20-pound charge of explosives is placed in the hole, covered, and detonated. The detonated explosive sends a shock wave below the Earth's surface that is subsequently reflected back to the surface from various subsurface rock layers. In rugged topography, a portable drill is sometimes carried in by helicopter. In remote areas where there is little known subsurface data, a series of short seismic lines might be required to determine the subsurface geology. Subsequently, more extensive seismic lines are arranged to obtain the greatest amount of geologic information.

Seismic information can be obtained in two- (2D) or three- (3D) dimensional configurations. To obtain 3D seismic information, the seismic sensors and energy source are located along lines in a grid pattern. This type of survey differs from the more common 2D surveys because of the large volume of data and the intensive computerization of the data. The results are expensive to obtain but give a more detailed and informative subsurface picture. The orientation and arrangement of the components in 3D seismic surveys are less tolerant of adjustments to the physical locations of the lines and geophones, but they are also more compact in the area they cover. Although alignment can be fairly critical, spacing of the lines can often be changed to significantly increase the information collected. The depth of the desired geologic information dictates the spacing of the grid lines, with smaller spacing detailing shallower formations. The 3D surveys are more detailed and are usually conducted after 2D surveys or drilling has delineated a geologic prospect. Extensive computer processing of the raw data is required to produce a usable seismic section from which geophysicists can interpret structural relationships to depths of 30,000 feet or more. The effective depth of investigation and resolution are determined, to some degree, by which method is used.

A typical drilling seismic operation can use 10 to 15 people operating 5 to 7 trucks. Under normal conditions, 3 to 5 miles of line can be surveyed each day using the explosive method. Larger seismic operations may require up to approximately 160 personnel onsite during project operations. Work day shifts are 13 to 14 hour days, although some workers may occasionally be present earlier or later during the day, if necessary. The vehicles used for a drilling program include several vehicle- mounted or heli-portable drill rigs, helicopters, water trucks, a computer recording truck, and several light pickup trucks for the surveyors, shot hole crew, geophone crew permit man, and party chief.

Use of off-highway vehicle (OHV) travel may be authorized to carry out cross-country tasks. Vehicles are spread out so that vehicle routes are not straight, and vehicles do not retrace the same route. In some cases, this approach has prevented the establishment of new vehicle routes and has reduced impacts. Drilling water, when needed, is usually obtained from a permitted source.

Reconnaissance type surveys of gravity and geomagnetic can be run in areas where there is limited information with the attendant lower costs and less impact. More expensive and higher impact seismic surveys are run when more detailed information is required.

V.2. Geophysical Management (Permitting Process)

Geophysical operations on and off an oil and gas lease are reviewed by the appropriate federal surface management agency (e.g., BLM, Bureau of Reclamation, or U.S. Forest Service). Effective administration and surface protection can only be accomplished through close cooperation between the operator and the affected agency. The responsibilities of the geophysical operator and the authorized officer are as follows (BLM 2006f).

Geophysical Operator: An operator is required to file with the authorized officer a Notice of Intent to Conduct Oil and Gas Exploration Operations. The Notice of Intent shall include site-specific project information and field techniques to minimize surface impacts; a map showing the location of the proposed 2D geophysical lines or 3D source and receiver proposed locations; all access routes and ancillary facilities; and a proposed schedule of field activities. The map should be at a minimum scale of one-half inch equals 1 mile; however, a 1:24,000 USGS topographic map is recommended.

The party filing the Notice of Intent should be bonded. When applicable, a copy of the bond or other evidence of satisfactory bonding must accompany the Notice of Intent. Holders of statewide or nationwide oil and gas lease bonds may satisfy this requirement by obtaining a rider to include coverage of geophysical operations.

For geophysical operation methods involving surface disturbance, a cultural resources survey may be necessary. In some circumstances, sensitive or Threatened and Endangered species surveys may also be necessary. A pre-work field conference is recommended and may be conducted by the surface management agency. Earth moving equipment shall not be used without prior approval. Upon completion of operations, including any required reclamation, the operator is required to file a Notice of Completion of Oil and Gas Geophysical Exploration Operations (BLM Form 3150-5).

Authorized Officer: The authorized officer will contact the operator after the Notice of Intent (BLM Form 3150-4) is filed and inform the operator of the practices and procedures to be followed and the estimated timeframe for approval.

The authorized officer will complete a final post-work inspection of the site and notify the operator that the terms and conditions of the Notice of Intent have been met or that additional action is required by the operator. Consent to release the bond or terminate liability will not be granted by the surface management agency until the operator has met the terms and conditions of the Notice of Intent (e.g., National Environmental Policy Act [NEPA], approved Form 3040-1) before commencing operations on BLM- administered lands. After the operations are completed, as specified by the Notice of Completion, the authorized officer should complete a final inspection and notify the operator if the terms and conditions of the Notice of Intent have been met or if additional action is required. Consent to release the bond or termination of liability should not be granted until the terms and conditions have been met.

V.2.1. State Standards

The operator is required to register with the Wyoming Oil and Gas Conservation Commission (WOGCC). WOGCC standards for plugging shot holes and personnel safety will be followed.

V.2.2. Mitigation

Seasonal restrictions may be imposed to reduce conflicts with wildlife, watershed damage, and hunting activity. The most critical management practice is compliance monitoring during and after seismic activity. Compliance inspections during the operation ensure that stipulations are being followed. Compliance inspections upon completion of work ensure that the lines are clean, and the drill holes are properly plugged.

V.3. Oil and Gas Leasing

Based on the Federal Onshore Oil and Gas Leasing Reform Act of 1987, all leases must be available for competitive lease sales. Lands for which bids are not received at the lease sale will be available for noncompetitive leasing for a period not to exceed 2 years. Competitive sales will be held at least quarterly and by oral auction. Competitive and noncompetitive leases are issued for a 10-year term or for as long as oil and/or gas are produced. The federal government receives yearly rental fees on non-producing leases. Royalty is received at the rate of 12.5 percent of the total saleable production, one-half of which is returned to the State of Wyoming.

Lease stipulations may be attached to each parcel and become part of the lease after sale. Initially, stipulations are attached to a parcel by the BLM State Office leasing section from various databases. The parcel list is segregated and sent to the field office that has the parcel lands in its area. In the field office, the parcel is reviewed by a group of resource specialists to ensure that lands are in conformance with the RMP, the stipulations are correct, and that any missing stipulations are included. This completes the process and allows the parcel to be included in a sale package.

The authorized officer has the authority to relocate, control timing, and impose other mitigation measures under Section 6 of the Standard Lease Form. This authority is invoked when lease stipulations are not attached to the lease, or new resources are discovered on a lease. Lease stipulations are conditions of lease issuance that provide protection for other resource values or land uses by establishing authority for delay, site changes, or the denial of operations within the terms of the lease contract. The stipulations are specified for each applicable parcel in the Notice of Competitive Oil and Gas Lease Sale and are intended to inform interested parties (potential lessees, operators) that certain activities will be regulated or prohibited unless the operator and the surface management agency arrive at an acceptable plan for mitigation of anticipated impacts. These stipulations are either attached to the entire lease, or by aliquot portions identifying the protection measure specific to the lease.

Lease stipulations are based on the perceived resource requirements and land uses as specified in NEPA documentation. New science, comprehensive documentation of resource requirements, land pattern interference, and ongoing monitoring of the effectiveness of a stipulation may allow granting of a waiver, exception, or modification to a stipulation. A lease stipulation waiver is a permanent exemption to a lease stipulation. An exception is a one-time exemption to a lease stipulation and is determined on a case-by-case basis. A modification is a change to the provisions of a lease stipulation, either temporarily, or for the term of the lease.

There are three lease notices and three lease stipulations that are attached to every lease issued within the planning area. These and the site-specific lease stipulations are included in Appendix H (p. 1959).

V.4. Drilling Permit Process

In the initial permitting process, the operator selects the location of a proposed drill site. This selection is based on WOGCC spacing requirements, the subsurface geology, the topography, and the avoidance of known protected surface resource values.

Location of wells and spacing requirements are established by the WOGCC to protect the correlative rights of offsetting mineral owners and efficiently recover the resource. This applies to all mineral ownership (i.e., fee, state, and federal minerals). The spacing requirements are to be applied to the subsurface point of production. A proposed location may be moved beyond the designated tolerance by a spacing exception granted by WOGCC. A spacing exception requires notification of the offsetting mineral lease owners. If there is a protest, the matter must be presented at a public hearing with full evidence of the need to relocate the well before a decision can be made by WOGCC. Surface density of wells would be a variable based on the surface resource conflicts, economics of directional drilling and the subsurface density. Coalbed natural gas (CBNG) wells are typically spaced on an 80 acre pattern, vertical oil and gas wells are typically spaced on a 40 acre pattern, and horizontal oil and gas wells are spaced from 1,280 acres down to 320 acres depending on geologic conditions.

V.4.1. Permitting

Permitting a new well is governed by Onshore Oil and Gas Order No. 1 and other applicable federal and state laws and regulations. This includes new and future laws and regulations such as the residence setback being finalized by the WOGCC. After the operator makes a decision to drill a well, the well, access road, and pipeline can be surveyed and staked without prior approval from BLM. Cultural resource inventories and wildlife surveys can also take place without prior approval from BLM. An Application for Permit to Drill (APD) or Reenter, on Form 3160–3, is required for each proposed well, and for reentry of existing plugged and abandoned wells (including disposal and service wells). Further details on the APD process are described below. Three methods of notification are as follows:

Early Notification - The operator may wish to contact the BLM and any applicable surface management agency, as well as all private surface owners, to request an initial planning conference as soon as the operator has identified a potential area of development. Early notification is voluntary and would precede the Notice of Staking option or filing of an APD.

Notice of Staking Option - After the operator makes the decision to drill a well, it must decide whether to submit an Notice of Staking or an APD. The Notice of Staking is an abbreviated notice that consists of a filled Notice of Staking form, a sketch showing road entry onto pad, pad dimensions, and reserve pit(s), and a topographical or other acceptable map showing location, access road and lease boundaries. This notice is posted for a 30-day public review. The Notice of Staking triggers the onsite inspection of the well, which determines whether there are any conflicts with critical resources, as well as provides the preliminary data to assess what additional items are necessary to complete the APD. The onsite inspection is conducted by an interdisciplinary team of specialists from the BLM including but not limited to a Natural Resource Specialist, wildlife biologist, archeologist, soil scientist, civil engineer, hydrologist, petroleum engineer and geologist. Along with the BLM representatives there will be company representatives and other agency specialists such as U.S. Fish and Wildlife Service, Wyoming Department of Environmental Quality, and Wyoming Game and Fish Department. In the case of

split estate the landowner or a representative of the landowner may be present. During the onsite inspection any notes taken are incorporated into the administrative record for the processing of the APD. Any conflicts identified during the onsite inspection will be addressed and mitigated when the APD is submitted. Some conflicts may be addressed by moving the surface location of the well up to 200 meters from the original location. The proposed access route and pipeline can also be proposed to be moved at this time.

Application for Permit to Drill - The operator can submit a completed APD in lieu of an Notice of Staking, but in either case, no surface-disturbing activity can be conducted in conjunction with the drilling operations until the APD is approved by the authorized officer. Operators are encouraged to consider and incorporate Best Management Practices (BMPs) into their APDs because BMPs can result in reduced processing times and reduced number of Conditions of Approval (COAs).

If the APD option is used, an APD is submitted to the authorized officer. In order for the APD to be approved it has to be deemed complete and appropriate site specific NEPA has to be conducted. A complete APD contains a completed form 3160-3, a well plat, a 9 point drilling plan, a 12 point surface use plan, appropriate bonding, an operator certification as described in Onshore Oil and Gas Order 1 III.D.6., and an onsite inspection as described in the Notice of Staking option. In the Buffalo Field Office (BFO), a water management plan is required for processing of the APD as explained in the 2003 Powder River Basin EIS and associated Record of Decision. Included with the approval of an APD, site-specific mitigations are added to the APD as COA for protection of surface and subsurface resource values in the vicinity of the proposed activity that were not mitigated as part of the proposed action.

The field office is responsible for preparing environmental documentation necessary to satisfy the NEPA requirements and provide any mitigation measures needed to protect the affected surface and subsurface resource values. The drilling program is reviewed by geologists, petroleum engineers, and possibly hydrologists to ensure the proposed plan meets applicable federal laws and isolates identified zones of interest. These zones of interest include but are not limited to usable water zones (defined as waters containing less than 10,000 ppm total dissolved solids), coal zones, uranium bearing zones, bentonite zones, salt zones, hydrocarbon zones, waste disposal zones, lost circulation zones, high pressure zones, and zones containing hydrogen sulfide. This review looks at how the casing and cement program is designed to ensure the design is sufficient to isolate and protect the formations of interest while also being strong enough to handle any pressures that the well may encounter. These pressures come from the muds used in drilling the well, the formation pressure exerted by the producing zone, or the pressures exerted during the hydraulic fracturing of the well.

Usable water is protected by casing and cement. The shallower fresh water zones (containing less than 5,000 parts per million Total Dissolved Solids) are typically isolated by the surface casing and associated cement job. Within the planning area for this RMP there are deeper fresh water zones that cannot be isolated with the surface casing and associated cement job. When the formations cannot be isolated with the surface casing and cement job then they are isolated with either the intermediate or production casings and cement operations. The zones that are typically deeper are the Fox Hills Sandstone and Madison Formation. Neither of these zones are encountered when drilling CBNG wells but the Fox Hills is always encountered when drilling deeper oil and gas wells. The Madison is not typically encountered during drilling in the planning area as it is located below the economically producible hydrocarbon bearing zones. Determining the depth of fresh water requires specific water quality data in the proposed well vicinity or geophysical log determination of water quality, depending on existing well proximity and log

availability. If water quality data or logs from nearby wells are not available, the area within a 2-mile radius of the proposed well is checked for water wells. If wells exist, the entire formation in which the wells are located is required to be isolated in the new well. In the BFO, usable water can be available to great depths and beyond the surface casing setting point. In order to protect all usable water, the surface casing is set anywhere from 1,000 feet to 3,500 feet in depth and cemented back to surface. The next string of casing is set at least 100 feet below the deepest usable water zone expected to be encountered in the well and the casing is cemented back to a point where the usable waters are isolated from deeper hydrocarbon bearing zones. These depths are verified on a case-by-case permit basis by a staff geologist and petroleum engineer. An additional protection measure that is required is the use of fresh water based muds while drilling through a usable water zone until that zone is isolated by casing and cement. If there is not enough information to determine whether the water is usable it is treated as usable for protection purposes. Figure V.1, "Generalized Stratigraphic Chart of the Powder River Basin and Buffalo Planning Area Showing Water and Mineral Zones" (p. 2606) highlights those formations that will be isolated and protected in relation to all formations in the planning area.

<table>
<tr><td colspan="4">Rock Unit</td></tr>
<tr><td colspan="2">Western</td><td colspan="2">Eastern</td></tr>
<tr><td colspan="4">White River Formation</td></tr>
<tr><td colspan="4">Wasatch Formation</td></tr>
<tr><td rowspan="3">Fort Union Formation</td><td colspan="2">Tongue River Member</td><td rowspan="3">Fort Union Formation</td></tr>
<tr><td colspan="2">Lebo Shale Member</td></tr>
<tr><td colspan="2">Tullock Member</td></tr>
<tr><td colspan="3">Lance Formation</td><td>Hell Creek Formation</td></tr>
<tr><td colspan="4">Fox Hills Sandstone</td></tr>
<tr><td>Bear Paw Shale</td><td>Lewis Shale (Teckla Sandstone Member)</td><td colspan="2" rowspan="2">Pierre Shale</td></tr>
<tr><td>MesaVerde Formation (Teapot Sandstone and Parkman Sandstone members)</td><td>Pierre Shale</td></tr>
<tr><td rowspan="2">Cody Shale (Sussex and Shannon sandstones, Steele Shale, Niobrara and Sage Breaks members</td><td colspan="3">Niobrara Formation</td></tr>
<tr><td rowspan="3">Frontier Formation (wall Creek, 2nd Wall Creek, and Belle Fourche members)</td><td colspan="3">Carlile Shale (Sage Breaks, Turner Sandy, and Pool Creek members)</td></tr>
<tr><td colspan="3">Greenhorn Formation</td></tr>
<tr><td colspan="3">Belle Fourche Shale</td></tr>
<tr><td colspan="4">Mowry Shale</td></tr>
<tr><td colspan="2">Muddy Sandstone</td><td colspan="2">Newcastle</td></tr>
<tr><td colspan="2">Thermopolis Shale</td><td colspan="2">Skull Creek Shale</td></tr>
<tr><td rowspan="2">Clovery Formation</td><td colspan="2">Fall River Formation</td><td rowspan="2">Inyan Kara Group</td></tr>
<tr><td colspan="2">Lakota Formation</td></tr>
<tr><td colspan="4">Morrison Formation</td></tr>
<tr><td colspan="2">Sundance Formation (“Upper” and “Lower” Sandstone)</td><td colspan="2">Sundance Formation (Redwater Shale, Pine Butte, Lak, Hullet Sandstone, Stockade Beaver, and Canyon Springs members)</td></tr>
<tr><td colspan="4">Gypsum Spring Formation</td></tr>
<tr><td>Popo Agie Formation</td><td colspan="3"></td></tr>
<tr><td>Crow Mountain Sandstone</td><td colspan="3" rowspan="3">SpearFish Formation (Pine Salt, Forelle Limestone, and Glendo Shale members)</td></tr>
<tr><td>Alcova Limestone</td></tr>
<tr><td>Red Peak Formation</td></tr>
<tr><td colspan="2" rowspan="2">Goose Egg Formation (Little Medicine Limestone, Freezeout Shale, Ervay, Difficulty Shale, Forelle Limestone, Glendo Shale, Minnekahta Limestone, and Opeche Shale members)</td><td colspan="2">Minnekahta Limestone</td></tr>
<tr><td colspan="2">Opeche Shale</td></tr>
<tr><td colspan="2">Tensleep Sandstone</td><td colspan="2" rowspan="2">Minnelusa Formation</td></tr>
<tr><td colspan="2">Amsden Formation</td></tr>
<tr><td colspan="2" rowspan="2">Madison Limestone</td><td colspan="2">Pahasapa Limestone</td></tr>
<tr><td colspan="2">Englewood Limestone</td></tr>
<tr><td colspan="2">Bighorn Dolomite</td><td colspan="2">Whitewood Dolomit</td></tr>
<tr><td colspan="2"></td><td colspan="2">Winnipeg Formation</td></tr>
<tr><td colspan="2">Gallatin Limestone</td><td colspan="2" rowspan="3">Deadwood Formation</td></tr>
<tr><td colspan="2">Gros Venture Formation</td></tr>
<tr><td colspan="2">Flathead Sandstone</td></tr>
<tr><td colspan="4">Source: Stilwell et al. 2012
All Formations colored in blue are isolated and protected water zones.
All Formations colored in grey are isolated and protected hydrocarbon bearing zones.
All Formations colored in green are isolated and protected for both water and hydrocarbon bearing zones.</td></tr>
</table>

Figure V.1. Generalized Stratigraphic Chart of the Powder River Basin and Buffalo Planning Area Showing Water and Mineral Zones

All casing used in the construction of a well has to meet American Petroleum Institute standards for that grade and weight of casing. The standard is to use new casing but there is an allowance for using used casing when it meets a minimum wall thickness of 87.5 percent of the new pipe. Used casing has to be approved on a site specific basis by the authorized officer. The casing design has to meet minimum safety factors for burst rating, collapse rating and yield ratings. These designs take into account the maximum pressure and stress that will be applied to the casing in the given permit.

The cements used in the construction of the well are tested in a lab under simulated field conditions. The cements have to meet minimum design criteria in order to be approved for use. All non-"neat" cements require the lab data to accompany the permit for review by the petroleum engineer. "Neat" cement is cement that has no additives to modify its setting time or rheological properties. In the planning area additives are typically added to reduce the weight of the cement thereby reducing the hydrostatic head exerted on the formation. This ensures the cement does not break down the formation and stays where it was intended to be. The top of all cement that is not circulated back to surface is verified through electric logging operations and any remedial actions are taken before the well is put into production. Remedial actions would be undertaken when the logging operations show that the formations of interest have not been isolated.

When final approval is given by BLM, the operator can commence construction and drilling operations in accordance with the approved permit. Approval of an APD is valid for 2 years. If drilling does not begin within the 2 years the permit may be extended up to 2 more years at the operator's request. This extension may be granted after the appropriate NEPA analysis is conducted. The operator is responsible for reclaiming any surface disturbance that resulted from its actions, even if a well was not drilled.

Economic conditions dramatically affect drilling activity. A downturn in the oil and gas market could create a significant decrease in the number of drilling wells within the BFO. More information on drilling and production trends for the BFO can be found in the reasonable foreseeable development (RFD) scenario created for the RMP and EIS.

V.4.2. Standard Drilling Conditions of Approval

In addition to any COAs that are developed during the environmental analysis, APDs are also subject to BFO's standard drilling COAs which are listed below.

For CBNG wells:

1. The operator shall complete wells (case, cement and under ream) as soon as possible, but no later than 30 days after drilling operations, unless an extension is given by the BLM authorized officer.
2. If in the process of air drilling the wells there is a need to utilize mud, all circulating fluids will be contained either in an approved pit or in an aboveground containment tank. The pit or containment tank will be large enough to safely contain the capacity of all expected fluids without danger of overflow. Fluid and cuttings will not be squeezed out of the pit, and the pit will be reclaimed in an expedient manner.

Well Control Equipment

1. The flow line shall be a minimum of 30 feet from the wellbore and securely anchored. The 30-foot length of line is a minimum and operators must make consideration for increasing this length for topography and/or wind direction.
2. The flow line shall be a straight run.
3. The flow line must be constructed from non-flammable material.
4. All cuttings and circulating medium shall be directed to and contained in a reserve pit.
5. The nearest edge of the pits shall be a minimum of 25 feet from the rig.
6. A minimum of 2 feet of freeboard shall be maintained in the pits at all times.
7. The authorized officer may modify these requirements at any time if it is determined that increased pressure control is deemed necessary.
8. Verbal notification shall be given to the authorized officer at least 24 hours before formation tests, Blow Out Prevention tests, running and cementing casing, and drilling over lease expiration dates.

Cement Program

1. If there are indications of inadequate primary cementing of the surface, intermediate, or production casing strings; such as but not limited to no returns to surface, cement channeling, fallback or mechanical failure of equipment, the operator will evaluate the adequacy of the cementing operations. This evaluation will consist of running a cement bond log or an alternate method approved by the authorized officer no sooner than 12 hours and no later than 24 hours from the time the cement was first pumped.
2. If the evaluation indicates inadequate cementing, the operator shall contact a BLM BFO Petroleum Engineer for approval of remedial cementing work.
3. The adequacy of the remedial cementing operations shall be verified by a cement bond log or an alternate method approved by the authorized officer. All remedial work shall be completed and verified prior to drilling out the casing shoe or perforating the casing for purposes other than remedial cementing.
4. The cement mix water used must be of adequate quality so as not to degrade the setting properties of the cement. Any water that does not meet municipal quality water standards shall be tested by mixing the water and cement in a lab and comparing the results to the municipal quality water mix results. If the results show that the cement qualities are not the same or greater, then the non-municipal water shall not be used for mixing cement in the well.

Production Equipment

Other actions such as off-lease measurement, commingling, allocation, etc. shall be approved via a Notice of Intent sundry (Form No. 3160-5). Submission of additional information in the Plan of Development (POD) shall not be construed as permission for these items. If the operator wishes to use off-lease gas measurement for wells approved in this POD, they are required to obtain approval via a Notice of Intent sundry (Form No. 3160-5) prior to any gas production.

Well and POD Building Identification

1. From the time a well pad is constructed or a well is spudded (if no well pad needed), until abandonment, all well locations must be properly identified with a legible sign. The sign will include the well name and number, operator name, lease number, and the surveyed location.
2. At each POD building site where federal wells are metered, the operator is required to maintain a legible sign displayed in a conspicuous place. This sign is required to be in place at the time metering goes online. The sign shall include: POD name, Operator, federal well

names and numbers, federal lease numbers being metered at the POD building, and surveyed location of the building.

Protection of Fresh Water Resources

All oil and gas operations shall be conducted in a manner to prevent the pollution of all freshwater resources. All fresh waters and waters of present or probable future value for domestic, municipal, commercial, stock, or agricultural purposes will be confined to their respective strata and shall be adequately protected. Special precautions will be taken to guard against any loss of artesian water from the strata in which it occurs and the contamination of fresh water by objectionable water, oil, condensate, gas or other deleterious substance to such fresh water.

Miscellaneous Conditions

1. Any changes to the approved drilling plan and/or these COAs shall be approved by the BLM BFO Petroleum Engineer prior to being implemented.
2. If any cores are collected, a copy of all analysis performed shall be submitted to the BLM BFO Petroleum Engineer.

For Conventional and Unconventional Oil and Gas Wells:

1. Verbal notification shall be given to the authorized officer at least 24 hours before formation tests, Blow Out Prevention tests, running, and cementing casing, and drilling over lease expiration dates.
2. New hard-band drill pipe shall not be rotated inside any casing. Hard-band drill pipe shall be considered new until it has been run at least once.
3. All Blow Out Prevention Equipment tests shall include a 5 minute low pressure test between 250 psi and 500 psi with no drop in pressure with the only exception being the chokes. The chokes are only required to have the high pressure test held for a minimum length of time necessary to verify their functional integrity.
4. All operations must be conducted in accordance with all applicable laws and regulations: with the lease terms, Onshore Oil and Gas Orders, Notice to Leesee's; and with other orders and instructions of the authorized officer, unless a variance has been granted in writing by the authorized officer.
5. The Operator shall install an identification sign consistent with the requirements of 43 Code of Federal Regulation (CFR) 3162.6 immediately upon or before the completion of the well pad construction operations.
6. All Blow Out Prevention Equipment rated 5M or greater shall be isolated from the casing and tested to stack working pressure. All Blow Out Prevention Equipment tests shall be performed by a suitable test pump, not the rig-mud pumps and recorded on a chart. The chart shall be submitted to the BFO.
7. Low test on Blow Out Prevention Equipment shall be performed and passed before moving onto the high test for each component.
8. If there are indications of inadequate primary cementing of the surface, intermediate, or production casing strings; such as but not limited to no returns to surface, cement channeling, fallback or mechanical failure of equipment, the operator will evaluate the adequacy of the cementing operations. This evaluation will consist of running a cement bond log or an alternate method approved by the authorized officer no sooner than 12 hours and no later than 24 hours from the time the cement was first pumped.
9. If the evaluation indicates inadequate cementing, the operator shall contact a BLM BFO Petroleum Engineer for approval of remedial cementing work.

10. The adequacy of the remedial cementing operations shall be verified by a cement bond log or an alternate method approved by the authorized officer. All remedial work shall be completed and verified prior to drilling out the casing shoe or perforating the casing for purposes other than remedial cementing.
11. The cement mix water used must be of adequate quality so as not to degrade the setting properties of the cement. Any water that does not meet municipal quality water standards shall be tested by mixing the water and cement in a lab and comparing the results to the municipal quality water mix results. If the results show that the cement qualities are not the same or greater, than the non-municipal water shall not be used for mixing cement in the well.
12. All oil and gas operations shall be conducted in a manner to prevent the pollution of all freshwater resources. All fresh waters and waters of present or probable future value for domestic, municipal, commercial, stock or agricultural purposes will be confined to their respective strata and shall be adequately protected. Special precautions will be taken to guard against any loss of artesian water from the strata in which it occurs and the contamination of fresh water by objectionable water, oil, condensate, gas or other deleterious substance to such fresh water.
13. Any changes to the approved drilling plan and/or these COAs shall be approved by the BLM BFO Petroleum Engineer prior to being implemented.

V.4.3. Surface Disturbance Associated With Oil and Gas Drilling

Upon receiving approval to drill the proposed well, the operator moves construction equipment over existing roads to the point where the access road will begin. Generally, the types of equipment include trackhoe, dozers (track-mounted and rubber-tired), scrapers, and motor-graders. Moving equipment to the construction site requires moving several loads (some overweight and overwidth) over public and private roads. Existing roads and vehicle routes are improved in places and occasionally, culverts and cattleguards are installed as specified in the approved APD.

The length of the access road varies. Generally the route is selected to reduce impacts to resources identified in the NEPA document. Environmental factors or the landowner's preference might dictate a longer route. Roads will be existing two-track roads with only spot upgrades to crowned and ditched with up to a 30-foot running surface. The type of road is selected based on drilling and completions activities as well as production activities. Soil texture, steepness of the topography, and moisture conditions might require surfacing (e.g., gravel, dust suppressants) the access road. For CBNG wells the equipment is smaller and will typically be serviced by a two-track or primitive road. The production from CBNG wells is piped off location. The deeper oil and gas wells require a bigger road because the equipment used to construct an oil or gas well is much larger. The gas production from oil and gas wells is typically piped off location but the liquids are stored at either the wellsite or a centralized point for the field. The methods of production and the disposition of that production are described later on in this document.

All soil material suitable for plant growth is first removed and stockpiled in a designated area. Sites on flat terrain usually require slightly more than removing the topsoil material and vegetation. Drilling sites on ridge tops and hillsides are constructed by cutting and filling portions of the location. The majority of the excess cut material is stockpiled in an area that will allow it to be easily recovered for rehabilitation. It is important to confine extra cut material in a stockpile rather than to cast it down hillsides and drainages where it cannot be recovered for rehabilitation. The proposed wellpad design has to be balanced in there is no excess spoil dirt and fill dirt does

not have to be brought in from offsite to level the pad. Offsite materials may be brought in for surfacing of the wellpad and access road.

The amount of level surface required for safely assembling and operating a drilling rig varies with the type of rig, the depth, type of the well, and number of wells on the pad. The average size for a CBNG well pad is 2.5 acres initial disturbance with a long term disturbance of 1.5 acres. The average size for an oil and gas location varies from 2.75 acres to 23 acres of initial disturbance with a long term disturbance of 2 to 10 acres depending on the type and number of wells on the wellpad. In addition to the drilling rig footprint, a reserve pit may be constructed, usually square or oblong, but sometimes in another shape to accommodate topography. Generally, the reserve pit is 8 to 12 feet deep, but could be deeper to compensate for smaller length and width or deeper drilling depths. Most horizontally drilled wells utilize a closed loop or semi-closed loop system. With the closed loop system the drill cuttings are hauled to an approved disposal site for remediation. The semi-closed loop system has the cuttings buried on location. The cuttings are separated between water based mud cuttings and oil based mud cuttings. Both types of cuttings are dried and solidified before burial. If there is a reserve pit on location, the pit has to be dried and solidified before it can be reclaimed. Depending on the relationship of the location to natural drainages, it might be necessary to construct water bars or diversions. The amount of area disturbed for construction depends largely on the steepness of the slope and the size of the pad. Depending on the soil permeability, pits may be lined with an impermeable material to contain the drilling fluids. If water is encountered while digging the reserve pit, a closed loop mud system, consisting of steel tanks, will be required.

Moving a drill rig will require from 5 to 50 truck trips of construction equipment over public highways and private roads. Drill rigs for CBNG as compared to deep drilling rigs are smaller, require fewer loads, and are generally only on location for a couple of days to a week. The bigger rigs used to drill the vertical and horizontal wells will be on location anywhere from a week to 8 months depending on the depth and number of wells on the location.

Water for drilling and well completion may be hauled or piped to drilling locations. Water sources are usually commercial water sources or recycled water if drilling is below the surface casing and fresh water aquifer zones. When drilling commences, and as long as it progresses, water is continually transported to the rig location. Depending on the type of well being drilled anywhere from 5,000 barrels to 100,000 barrels of water is needed for drilling and completion activities. More water would be required if circulation is lost, or permeable zones that cannot withstand the pressure of the drilling fluid are encountered.

V.4.4. Issuance of Rights-of-Way

Rights-of-way (ROW) are required for all facilities, tank batteries, pipelines, powerlines, and access roads that occupy federally owned land outside the lease or unit boundary. When a third party (someone other than the operator) constructs a facility or installation on or off the lease, a ROW is also required. The ROW is issued by BLM.

V.5. Drilling Operations

This section describes more conventional or traditional drilling operation techniques. BLM encourages the use of other new alternative construction and drilling techniques and technologies designed to limit environmental effects.

V.5.1. Rotary Drilling

Initially, drilling proceeds rapidly because of the less competent nature of shallow formations. Drilling is accomplished by rotating the drill string and putting variable weights on the bit located at the bottom of the string. While drilling, the derrick and associated hoisting equipment bear a majority of the drill string's weight. The combination of rotary motion and weight on the bit causes rock to be gouged away at the bottom of the hole. There are two types of rotary drilling. The first type is the older style which includes a kelly and rotary table. The second type is a top drive system. The rotary motion on the older style is created by a square or hexagonal rod, called a kelly, which fits through a square or hexagonal hole in a large turntable, called a rotary table. The rotary table sits on the drilling rig floor and as the bit advances, the kelly slides down through it. When the kelly has gone as deep as it can, it is raised, and a new piece of drill pipe about 30 feet in length is attached in its place. The drill pipe is then lowered, the kelly is reattached, and drilling recommences. The top drive system does not have a rotary table or a kelly. The rotation of the drill string is accomplished with the top drive unit which is hydraulically driven. Since there is no kelly a piece of drillpipe is screwed together at the top and drill string. When this piece of pipe reaches the rig floor drilling stops and a new piece of pipe is connected. The drillpipe is the same for both styles of rotary drilling. When the bit becomes dull, it is necessary to trip the drill string and replace the bit. This is a time-consuming process of withdrawing 90-foot sections of the drill pipe until the bit is out of the hole. This trip can be anywhere from a couple of hours roundtrip to a couple of days depending on the length of the drillpipe and any hole problems that may be encountered. Each time a string of casing is run you must first trip the drillpipe out of the hole. New bits constructed with modern metals and manufactured polycrystalline diamonds along with down hole mud motors have revolutionized drilling operations, whereby thousands of feet of hole can be drilled with one bit run. The mud motor is a positive displacement pump (moineau pump run in reverse) driven by high-pressure mud and is placed at the top of the bit to enable more rotational power to be transmitted to the bit and thus increase penetration rates.

Drilling a directional or horizontal well requires extra tools to be used in the drill sting. These tools include bent pieces of pipe to angle the drilling direction of the hole, measurement while drilling tools, and mud motors. The bent pipe is manufactured with a bend in the pipe of 0.5 degrees to 3 degrees. Having a mud motor after the bent piece of pipe allows the driller to rotate the drill bit without having to rotate the drill string thus causing the bit to drill away from vertical at a controlled rate. Within a couple of joints of drill pipe from the drill bit the measurement while drilling tools are installed to relay the direction and penetration angle of the drill string. Once the desired angle has been attained rotary drilling may commence again to the total depth of the well.

Drilling mud is circulated through the drill pipe to the bottom of the hole, through the bit, up the annulus (i.e., the space around a pipe in a wellbore) of the well, across a screen that separates the rock chips, and into holding tanks from which finer sediments settle from the mud before it is pumped back into the well. The mud is maintained at a required weight and viscosity to cool the bit, reduce the drag of the drill pipe on the sides of the hole, seal off any porous zones, contain formation fluids to prevent a blowout, and bring the rock chips to the surface for disposal. Various additives are used in maintaining the mud at the appropriate viscosity and weight. Most of the mud consists of bentonite. Some of the additives are caustic, toxic, or acidic, but these hazardous additives are used in small amounts during the drilling operations and later contained at the surface.

Within the BFO, drilling is usually accomplished with water or light mud to depths within about 1,000 feet of the prospective formation. Water and natural clays recovered during the

drilling operation, or light drilling mud, allow fast drilling rates and the attendant reduction in mud chemicals. Once the bit reaches the target depth, the mud system is gradually made more sophisticated by addition of bentonite, chemicals, and natural weight materials to reduce water loss to the potential producing zones and to control the subsurface pressure. In almost all cases except CBNG, the subsurface pressure is higher than an equivalent water column, and it is necessary to increase the mud weights to control the pressure and prevent a blowout or uncontrolled flow of formation fluids. Many wells are drilled in an underbalanced condition, whereby the mud pressure is slightly less than the formation pressure, which increases penetration rate and reduces the time on the well, or in the formations of interest. Drilling in this condition also reduces the potential of damaging the formation, with the attendant loss of flow capacity and recovery. The wells are always overbalanced for safety requirements when a bit trip is made, the well is logged, or the casing is installed.

Drilling operations are continuous, 24 hours a day, 7 days a week. The crews usually work three 8-hour shifts or two 12-hour shifts a day. Pickup trucks or cars are used for workers' transportation to and from the site. During normal drilling operations typically the only people on location are the rig crew, company man, tool pusher, and mud logger. Other operations, such as cementing, running casing, and rig maintenance will require additional personnel who will not remain on location once their part of the operation is completed.

Upon completion of the drilling, a determination is made regarding the productive potential of the well. If oil or gas is not discovered in commercial quantities, the well is considered dry. The operator is then required to follow BLM procedures to properly plug the dry hole. These procedures are described in depth later in this appendix. The drill site and access road are then rehabilitated in accordance with the stipulations attached to the APD and the plugging approval. If the well is a producer, drilling operations continue until the production casing is cemented into the well and the well is secured. Once the casing has been cemented in place and the well is secure rig down operations commence to remove the drilling equipment from the location. The completion equipment and crews will come in at a later time and complete the well as described later in this appendix.

V.5.2. Logging

Geophysical logs are obtained by running various instruments into the hole on a wire cable or attached to the drill string for Measuring While Drilling. Logs are usually run at a depth point where casing will be installed. A log is not usually run before surface casing is set, but in most instances a log recording natural gamma radiation is run through the surface casing to determine the geology of that section. If cement was not circulated to surface a cement bond log or temperature log will be run and interpreted to decide the course of remedial operations. The logs can determine water resistivity, hydrocarbon saturations, natural gamma radiations, porosity of the rock by density, nuclear receptivity and sonic measurements, permeability, pressure, temperature, hole geometry including hole size for cement calculations, and subsurface direction. Logs are used to evaluate whether the well is dry or has the potential for a satisfactory completion. Logs also delineate the various geologic horizons; hydrocarbon zones; fresh, usable, and unusable water; and sands, shales, limestone, coal, and other minerals. Logs are required to specify productive intervals so that they can be perforated and stimulated during the completion program. Normally in the BFO, logs recording resistivity and a combined porosity log of density and nuclear receptivity are run in the well. The dual porosity logs are a direct indicator of oil and gas because the measured values can be compared to provide contrasting porosities.

V.5.3. Casing

Various types of casing are placed in the drilled hole to enhance completion operations and safety. Casing is a string of steel pipe composed of approximately 40-foot lengths of pipe that are threaded together. Centralizers are attached to casing to ensure that the casing is centered in the hole. This practice improves the efficacy of cement jobs. Casing is cemented into the well to protect against migration of fluids along the annulus between the casing and the hole. Cementing isolates the formations so they can be completed and produced without interference from other zones containing hydrocarbons or water. Hole deviation, depth, bore hole environment, placement of centralizers, and a myriad of other factors affect the integrity of the casing and cement job, and must be considered in the original design.

Surface casing that is properly set and cemented also protects surface aquifers from contamination by drilling and production operations. Surface casing should be set to a depth greater than the deepest fresh water aquifer that could be reasonably developed. Surface casing is designed to be large enough to allow subsequent strings of smaller casing to be set as the well is drilled deeper. Cement is placed in the annulus of the surface casing from casing shoe to ground level. The surface casing is the first string on which blowout preventer equipment is installed. The blowout preventer equipment allows the well to be shut in at any time that conditions warrant, protecting against unanticipated formation pressures and allowing safe control of the well. Blowout preventer equipment is tested and inspected regularly by both the rig personnel and the inspection and enforcement branch of BLM. Minimum standards and enforcement provisions are part of Onshore Order No. 2.

Casing strings subsequent to the surface string are required to be cemented from the casing shoe to above any zone of interest as described previously. In the BFO, the annulus (i.e., the space around a pipe in a wellbore) is required to be filled with sufficient cement to provide adequate protection from interzonal migration of unsuitable water and hydrocarbons. Production casing or production liner is designed to provide isolation of oil and gas formations, and a high-pressure conduit to the hydrocarbon zones that allows stimulation of these intervals to improve the productivity.

For CBNG wells the surface casing is required to be set at a minimum of 60 feet or 10 percent of the well depth, whichever is greater. This is then required to be cemented back to surface. The next string of casing is the production casing which is set through the coalbeds or to the top of the coalbed depending on the type of completion that will occur. This casing string is then cemented back to the surface at the well site.

For the deeper oil and gas wells a conductor pipe is set to 60 feet to 80 feet, to control sloughing of the ground under the rig, and it is cemented back to surface. The next string of pipe is the surface casing. It is set anywhere from 750 feet to 3,000 feet and cemented back to surface. This depth is determined by the depth of the shallower fresh water zones, the lost circulation zones (i.e. coals), and where a competent formation can be found. The next sting of pipe that is installed in the well is typically the production string for vertical wells and the intermediate string for horizontal wells. These strings of pipe are required to be cemented from the shoe to the Lance formation. Many operators choose to cement all the way into the surface casing. This operation will isolate the Fox Hills Formation from any other zone both below and above it. For vertical wells there is no more casing installed but for a horizontal well the next string of pipe installed is the production liner. Depending on the geology this liner may be cemented from the shoe to the top of the liner. Other times it is set with swellable packers located on the outside of the casing.

These packers help to centralize the casing in the hole and provide a method for isolation of the production. The liner has to be set at least 100 feet above the shoe of the intermediate casing.

During completion operations, there are three ways to get a pathway for the oil and gas to migrate from the formation into the casing. The first way is to perforate the casing in the zone(s) of interest. The second option is called an openhole completion. The third option is to use a pre-slotted or perforated casing. All three methods can be used in both CBNG wells and the deeper oil and gas wells. Perforating the casing is usually done after the casing has been cemented in place. This is accomplished with a perforating gun. It consists of shaped explosive charges that will penetrate through the steel casing, cement sheath, and into the formation as much as 48 inches depending on the size of the explosive charge. This will leave a hole from 0.25 inch to 0.4 inch in the casing, cement and formation depending on the requested hole size. These perforations can be spaced from 1 shot per foot (spf) to 48 spf.

With an openhole completion casing is set to the top of the productive formation and then a smaller drill bit drills though the casing shoe and into the formation. The hydrocarbons are then produced through the well without an additional casing and cement. For those formations where sloughing occurs a steel or plastic pipe is run into the openhole to hold the formation back. This openhole may be under-reamed to enhance production. The under-reaming is accomplished by a drill bit that expands in diameter as it is rotated. Currently technology allows the under-ream to be about double the size of the casing that the under-reamer passes through. Under-reaming cannot be accomplished inside cased hole.

The third option for completions goes along with an openhole completion. For CBNG once the well has been under-reamed a pre-slotted liner is installed in the well to keep the coals from sloughing into the under-ream and closing off the path for the CBNG to flow. In horizontal wells, a slotted liner is sometimes used. This liner has swellable packers on the outside that provide both centralization and isolation within the formation for both completion operations and administrative purposes. The swellable packers absorb the drilling mud around them to swell like a sponge filling the annular space between the pipe and the formation. The slots in the liner are hydraulically actuated sleeves that open when a rubber ball is pushed through them. Each sleeve in the pipe requires a little larger ball so they can be opened from the end of the pipe back to the beginning of the pipe. Once the sleeve is opened the formation can be hydraulically fractured as described later in this appendix.

V.5.4. Hydraulic Fracturing

Hydraulic fracturing is the process of creating small cracks, or fractures, in deep, underground geological formations to liberate oil or natural gas and allow it to flow up the well for capture. To fracture the formation, fracturing fluids – approximately 99.5 percent water and sand, with the remaining percentage chemical additives – are injected down the wellbore into the formation. The fluid, injected under pressure, causes the rock to fracture along weak areas. These fractures typically range from 0.1 to 0.3 inches in width, 20 to 300 feet in height, and 300 to 1,500 feet in length. When the fractures are complete, and pressure is relieved, the fluids flow back up the well where they are captured and stored for later treatment or disposal. As the fluids flow back up, sand remains in the fractures and props the rock open. This allows the oil and gas to seep from the rock into the pathway, up the well and to the surface for collection. In the planning area, the targeted formations for hydraulic fracturing are often more than 7,000 feet underground, and some 2,000 feet below any drinking water aquifers.

The process is much different for CBNG wells then the deeper oil and gas wells. CBNG wells have water enhancements and are not hydraulic fractured as defined above. The water enhancement consists of up to 3,000 bbls of chlorinated water pumped at high rates into the coals. The pressure rarely exceeds 1,500 psi and other chemicals and sand are not used. This process cleans the cleats of the coals around the wellbore and allows the formation water and CBNG to flow more freely into the casing for extraction.

V.5.5. Oil and Gas Exploratory Units

Surface use in an oil or gas field could be affected by unitization of the leaseholds. In areas of federal and mixed mineral ownership, an exploratory unit can be formed before a wildcat exploratory well is drilled. The boundary of the unit is based on geologic data and attempts to consolidate the interests in an entire structure or geologic play. The developers of the unit enter into an agreement to develop and operate as a single entity, regardless of separate lease ownerships. Costs and benefits are allocated according to agreed-upon terms. Development in a unitized field can proceed more efficiently than in a field composed of individual leases because competition between lease operators and drainage considerations is not a primary concern. Unitization also can reduce surface use requirements because all wells are operated as though under a single lease, and operations can be planned for more efficiency. Duplication of field processing facilities is eliminated, and consolidation of facilities into more efficient systems is probable. Unitization can also involve wider spacing than usual, or spacing based on reservoir factor rather than a set rule, which could result in fewer wells and higher recovery efficiency. Through planning, access roads are usually shorter and better organized, and facilities are usually consolidated. Units are voluntary for operators to propose and cannot be required by BLM.

V.5.6. Field Development

New field development is analyzed in an environmental assessment (EA) or EIS after the sufficient confirmation wells are drilled. The operator generally can estimate the extent of drilling and disturbance required to extract and produce the oil and gas at that time. Many fields go through several development stages. A field can be considered fully developed, and can produce for many years when it is determined that a well can be drilled to a deeper pay zone, a new interval is discovered to be economically attractive, or drilling and completion technology changes. In this case, there is typically less new disturbance because the old wellbores or the old well pads are used for the new completions. With changes in drilling and completion technology the surface disturbance maybe reduced because fewer wells are required to drain the reservoir. A new stage of field development, such as infill drilling, can lead to increases in roads and facilities. All new construction, reconstruction, or alterations of existing facilities, including roads, flow lines, pipelines, tank batteries, or other production facilities must be approved by BLM and could require a new environmental document. Throughout field development, partial restoration and rehabilitation is required to reduce the surface impacts to the minimum required to produce the resource.

The most important factor in further development of an oil or gas field is the economics of production. When an oil or gas discovery is made, a well spacing pattern can be established before development drilling begins. This pattern is dependent on the current statewide or area wide spacing. Well spacing is regulated by WOGCC, and factors considered in the establishment of a spacing pattern include data from the discovery well that translate into recovery efficiency. These data include porosity, permeability, pressure, composition of reservoir and fluids, depth of

formations, well production rates, and the economic effect of the proposed spacing on recovery. These data are relatively sparse in the initial phase of development, and extended production permits refinement of these values. Because these data are so tentative, WOGCC tends to define large spacing until the data are more conclusive. Spacing requirements can pose problems in selecting an environmentally sound location or in the cumulative impacts because spacing is based on administration of correlative rights and not reservoir characteristics. Reservoir characteristics determine the most efficient spacing to achieve maximum recovery. If an operator determines that a different spacing is necessary to achieve maximum recovery, the State of Wyoming (with input from BLM) may grant exceptions to the spacing requirements.

V.6. Production

Gas, oil, and water are being produced in the BFO by means of natural pressure (flowing or plunger lifts) and artificial lift (gas and electric pumping units and submersible pumps). Gas and oil production methods are equivalent for vertical, horizontal and directional wells and are not separated in the discussion that follows.

V.6.1. Gas Production (other than CBNG)

A typical gas well facility consists of methanol injection equipment (to keep production and surface lines from freezing), separator (which separates gas, oil, and water), dehydrator (uses glycol or calcium chloride to extract entrained water in the gas), and an orifice meter. An intermitter is sometimes used to either shut-in the well to build up pressure, or to blow the well down if it is being loaded with fluid. If the gas well is producing some oil or condensate, oil tanks are used to store the oil or condensate until it is sold by truck or pipeline. Pipeline quality gas at the wellhead requires a minimum of processing equipment. As the quality of gas decreases with the increased presence of water, solids, or liquid hydrocarbons, the amount of processing equipment increases. Water or liquid hydrocarbons in the gas are removed before the gas is sold, usually in the separation equipment near the wellhead. If liquid hydrocarbons are present, storage facilities (tank batteries) are required to store the liquids until they accumulate in sufficient quantities to be hauled out by large trucks. Gas dehydration equipment might also be onsite to remove water entrained in the gas to a water content defined by pipeline specifications. Gas production data can be found in the RFD scenario for oil and gas that was developed for the revised RMP.

Gas that occurs with oil is separated by collecting it into feeder lines leading to compressors that boost the pressure to the transportation system, venting or flaring. If enough casing head gas is separated to make it economical for marketing, a plant can be constructed to process the gas, or a pipeline can be constructed to carry the product to an existing plant. If the volume of casing head gas is insufficient to warrant treatment in a gas plant, it is usually used as fuel for pump engines in the field, or as heating fuel for the heater-treaters. Gas may be flared or vented into the atmosphere if the quantity exceeds the fuel requirements on the lease but is not recoverable in commercial quantities. Venting and flaring has to meet the requirements of NTL-4A and be approved prior to commencing. Typically for federal wells, gas is flared within the first 30 days after completion or until the well has produced 50,000 MCF of gas whichever occurs first. Any venting or flaring beyond this limit has to have approval prior to commencing. The request for venting or flaring has to include economic data along with other reasons as to why the gas cannot be inserted into a pipeline for sales.

V.6.2. Oil Production

In the BFO, oil is generally produced using artificial lift methods (pump units). The oil production equipment, such as heater-treater, tank battery, and holding facility for production water, are either placed on a portion of the location (on cut rather than fill) and located a safe distance from the wellhead, or placed as a centralized facility that services a number of wells with pipeline connections. The heater treater and tanks are surrounded by earthen dikes to contain accidental spills. Either all the facilities or only the produced water pit (if present) will be fenced. Production facility colors are required to be from the standard color chart and are specified in the APD COAs.

Production from several wells on one lease can be carried by pipeline to a central tank battery. Use of a central tank battery can depend on whether the oil is from the same formation, the same lease ownership, or multiple lease ownerships and formations, or whether a commingling agreement is approved. Because of the nature of the oil, adequate separation of oil and water is enhanced or accelerated through applications of heat and chemicals. The fluid stream arrives at a separator point where the flash gas is taken off. In most cases, this flash gas is used for lease operations. The remainder of the flash gas is either compressed and sold or flared. Flash gas is defined as solution gas liberated from the oil through a reduction in pressure. Water and oil are also being separated at this point by gravity segregation. The oil is sent to storage tanks, and the water is sent to a disposal or injection facility. Two main methods of oil measurement used in the BFO are lease automatic custody transfer units and tank gauging. Measurement is required by 43 CFR 3162.7-2 and Onshore Order No. 4 to ensure proper and full payment of federal royalty.

Oil wells can be completed as flowing (those wells with sufficient underground pressure to raise the oil to the surface), or if the pressure is inadequate, they are completed with the installation of subsurface pumps. The subsurface pumps are usually mechanically powered by a pumping unit. Pumping units come in a variety of sizes, the larger ones reaching a height of 30 to 40 feet. The units are powered by internal combustion engines or electric motors. Fuel for the engines may be casing head gas or propane. In cases where large volumes of water are produced with the oil, electric submersible pumps can be installed. These pumps could produce up to 6,000 barrels of fluid per day at an oil cut of ½ of 1 percent oil. Oil production data can be found in the RFD scenario for oil and gas that was developed for the revised RMP.

V.6.3. CBNG Production

CBNG production combines high water production rates of some oil fields with low- pressure operations of some gas fields. Because of the reservoir characteristics of coal, high water production rates are initially required to dewater the reservoir and allow gas to be liberated from cleat surfaces (i.e., the vertical cleavage in coal seams) within the coal. In a coal reservoir, gas is primarily trapped on the face of the coal within the cleat system by molecular attraction. Pressure must be reduced to liberate the gas molecules from the coal face. The production history shows that water production rates begin high, with little or no gas. The water rate then drops at a constant rate, with increasing gas rates until a maximum gas rate is achieved relative to the original gas saturation and reservoir pressures. The gas rate then declines to the economic limit. This process is the exact opposite of that associated with most oil and gas production, which starts at high hydrocarbon rates and low water rates and advances to low hydrocarbon rates and high water rates. The reservoir depths of CBNG production are generally shallow (less than 3,500 feet) compared with most oil and gas production in the BFO. The depth limit is based on coal permeability, which is highly sensitive to overburden weight. A CBNG operation usually

consists of a high-capacity submersible or progressive cavity pump, with water produced out of the tubing, and low-pressure gas produced out of the casing. Centralized facilities collect the gas for compression to pipeline pressures and the water for disposal. Electric power is usually used to power the well pumps and is connected to the well by a subsurface cable laid with the water and gas lines. The producing well pad is very small, with only the wellhead and an insulating house to cover the wellhead. The centralized production facilities contain well header buildings where the individual well gas is measured, and where house collection tanks, injections wells, and pumps for disposal of the water as well as multistage compressors that bring the very low pressure gas to sales line pressure. Sometimes the water can be disposed of in the local drainages if the Wyoming Department of Environmental Quality, and the Wyoming State Engineer's Office (WSEO) and the BLM approve this type of disposal. Currently in the BFO, CBNG production is past its peak and is in a decline both from the amount of production and the number of wells expected to be drilled. The RFD has further discussions production and the future prognosis of CBNG on development within the BFO.

V.6.4. Water Production

Produced water associated with oil, gas, or CBNG is disposed of by trucking or piping the water to an authorized disposal pit, placing the water in lined pits, discharging the water into surface drainages, or through subsurface injection. Water disposal is controlled by both the BLM and WOGCC for subsurface disposal and secondary recovery purposes. The quality of the water often dictates the appropriate disposal method, and Wyoming Department of Environmental Quality has primacy through the Environmental Protection Agency to approve surface disposal of this water. Produced water is also used in enhanced recovery projects. The RFD contains further discussions on produced water production rates.

V.6.5. Production Problems

Weather extremes pose problems for producers by causing roads to become impassable, equipment to malfunction, and flow lines, separators, and tanks to freeze up. Other problems producers may encounter in the area are production of hydrogen sulfide (H_2S), carbon dioxide (CO_2), and paraffin; corrosion; electrolysis; and broken flow lines.

V.6.6. Secondary and Enhanced Oil Recovery

Gas reservoirs typically have no secondary recovery associated with the recovery of gas because natural gas is produced by expansion resulting from the reduction of reservoir pressure. A high reservoir recovery factor can be expected from this expansion process unless the reservoir is of such low permeability that economics becomes a factor in the recovery efficiency. Economics is a determining factor because of the expense of operating compression facilities to reduce the reservoir pressure to the minimum.

Secondary recovery in coal reservoirs has been tested in the San Juan Basin and found to be technically feasible. This recovery process involves the molecular replacement of natural gas by CO_2 or nitrogen. An oil reservoir typically contains oil, gas, and water trapped within the rock matrix under pressure. Because of the pressure, much or all of the gas is dissolved in the oil. Primary drive is accomplished by expanding gas in solution, which forces oil out of the reservoir into the well and up to the surface. Oil flowing out of the reservoir drains energy from

the formation and the primary drive diminishes. To keep oil flowing in the reservoir, pressure drawdown is required, and subsurface pumps could be used to lift oil to the surface. As reservoir pressures continue to drop, solution gas in the oil escapes, forming bubbles in the pore space. These bubbles further retard the flow of oil and increase the gas saturation and the flow of solution gas. This process accelerates as the pressure declines, and at some point, production rates become uneconomical, with as much as 80 percent of the original oil remaining in the reservoir. Currently, in the United States, primary oil recovery accounts for less than half of the current oil production. The remaining oil is produced by secondary and enhanced recovery techniques.

Two basic secondary recovery methods are in use—water flooding and displacement by gas. The preferred secondary recovery method is water flooding, which involves injecting water into oil reservoirs to maintain or increase pressure. The process is usually most efficient when the pressure has not fallen to the point where the reservoir is highly saturated with gas. Reservoir heterogeneity in the form of fractures, directional permeability, and thin zones could limit the success of this process.

The process of injecting gas is a less popular secondary recovery technique. Historically, produced gas was considered a waste product and was flared (burned) at the point of production. Later, it was recognized that the energy could be conserved and the recovery of oil increased if the produced gas was reinjected into the reservoir. Increased production was achieved by maintaining reservoir pressure by injecting the gas into the existing gas cap and also by injecting the gas directly into the oil-saturated zone, creating an immiscible gas drive that displaced the oil. To achieve miscibility, the reservoir must have reasonably high pressures and temperatures and contain high-gravity oil. Many gas injection projects use the water alternating gas process, which is injecting water and gas alternately to achieve better contact with the oil within the reservoir.

The term enhanced recovery is used to describe recovery processes other than the more traditional secondary recovery procedures. These enhanced recovery methods include thermal, chemical, and miscible (mixable) drives. Currently, no enhanced recovery techniques are being implemented within the BFO, but there is a large CO_2 enhanced recovery project to the south of the planning area in the Salt Creek Field. There are also preliminary CO_2 enhanced recovery projects being developed.

Some reservoirs contain large quantities of heavy oil that cannot be produced using normal or secondary methods. These reservoirs can be stimulated by thermal drive processes in which heat is introduced from the surface or developed in place in the subsurface reservoir. In the surface introduction process, hot water or steam is injected. Raising the temperature of heavy oil reduces the viscosity and makes the oil more mobile. In the in-situ process, both heavy and light oils can be processed. Spontaneous or induced ignition within the reservoir is induced by injected air to develop a fire front that burns the hydrocarbons. Evaporation of the lighter ends immediately ahead of the fire front, and later condensation is the primary recovery mechanism. The remaining hydrocarbons are consumed by the fire and are generally not considered of any value. These techniques are very expensive and must have large reserves and thick pay zones to be economical. It is unlikely these techniques will be used within the BFO in the immediate future unless new discoveries are made.

Several chemical drive techniques are currently in use, including polymer flooding, caustic flooding, and surfactant-polymer injection. These methods attempt to change reservoir conditions to allow recovery of additional oil. Caustic and surfactant-polymer flooding have not been economical in the past, and unless a breakthrough in technology is achieved, these techniques

will probably not be considered during the planning period. Polymer flooding is an economically viable process but is used mainly in viscous reservoirs with high permeability.

V.6.7. Gas Storage

Pipeline-quality gas can be stored in good quality reservoirs with sufficient sealing parameters. This gas is pumped into the reservoir during nonpeak, usually lower priced time periods, and then pumped out into the transmission lines at times of peak demand and higher prices. The price differential pays for the governmental fees required the use of the storage reservoir and the injection/compression costs required to store and retrieve the gas. Gas storage also serves as a buffer for cold periods when demand is high and levels out the summer slack period of production. There is one active gas storage reservoir within the BFO.

V.7. Plugging and Abandonment Of Wells

The purpose of plugging and abandoning a well is to prevent fluid migration between zones, to protect mineral and water resources from damage, and to restore the surface area. Each well must be handled individually because of a combination of factors, including geology, subsurface well design, and specific rehabilitation concerns; therefore, only minimum requirements can be established, and these must be modified for individual wells.

The first step in the plugging process is the filing of the Notice of Intent to Abandon. This notice is reviewed by both the surface management agency and BFO petroleum engineer and geologist. The notice must be filed and approved before plugging a previously producing well. Verbal plugging instructions can be given for plugging current drilling operations, but a notice must be filed after the work is completed. If usable fresh water was encountered while the well was being drilled, the surface management agency may be allowed, if interested, to assume future responsibility for the well. This assumption of responsibility becomes effective after the deeper zones are plugged back to the usable water zone. In all cases the productive zone is isolated prior to being turned over to the surface management agency.

The operator's plan for securing the hole is reviewed. The minimum requirements, as stated in Onshore Order No. 2, are as follows: In open hole situations, cement plugs must extend at least 50 feet above and below zones that have fluid with the potential to migrate, zones of lost circulation (this type of zone could require an alternate method to isolate it), and zones of potentially valuable minerals. Thick zones may be isolated using cement plugs across the top and bottom of the zone. In the absence of productive zones and minerals, long sections of open hole may be plugged with cement plugs placed every 3,000 feet. In cased holes, cement plugs must be placed opposite perforations and extending 50 feet above and below, except where limited by plug back depth. The length of the plug is 100 feet plus 10 percent per 1,000 feet (i.e., at 10,000 feet the plug will be 200 feet long).

Cement plugs could be replaced with a cement retainer, if the retainer is set 50 feet above the open perforations and the perforations are squeezed with cement. A bridge plug could also be used to isolate a producing zone and must be capped, if placed through tubing, with a minimum of 50 feet of cement. If the cap is placed using a dump bailer, a minimum of 35 feet of cement is required. A dump bailer is an apparatus run on wire line to convey the cement to the bottom of the hole. In the event that the casing has been cut and recovered, a plug is placed 50 feet within the casing stub, and the 100 feet plus 10 percent per 1,000 feet rule is used for the space

above the cutoff point. In all cases, a plug is set at the bottom of the surface casing that has a volume of cement using the 100 feet plus 10 percent per 1,000 feet rule. This could require perforating the casing and circulating or squeezing cement behind the production casing if that casing is not removed. Annular space at the surface will be plugged with 50 feet of cement using small-diameter tubing or by perforating and circulating cement.

If the integrity of a plug is questionable, or the position is extremely vital, it can be tested with pressure or by tagging the plug with the tubing or drill string. Tagging the plug involves running a pipe into the hole until the plug is encountered, and placing a specified amount of weight on the plug to verify its placement and competency. The surface plug within the casing must be a minimum of 50 feet. The interval between plugs must be filled with mud that will balance the subsurface pressures, and if this balance point is unknown, a minimum of 9 pounds per gallon is specified. After the casing has been cut off below the ground level, any void at the top of the casing must be filled with cement. A metal plate is welded over the top of the casing, a weep hole is placed in the plate. A permanent abandonment marker is required on all wells unless otherwise requested by the surface management agency. After the plugging operations have been completed a subsequent report of abandonment is filed detailing the operations and giving a status update on the reclamation of the well site. Once reclamation has occurred and the wellsite is ready for release a Final Abandonment Notice is submitted to the BLM for review. Usually this will occur after two full growing seasons have elapsed since seeding was finished.

The Surface Management Agency is responsible for establishing and approving methods for surface rehabilitation, and determining when this rehabilitation has been satisfactorily accomplished. With satisfactory rehabilitation, a final abandonment notice is approved, and the well bond is released.

Appendix W. Buffalo Water Resources Management Plan

Note: This appendix was added following the release of the Buffalo Draft Resource Management Plan and Environmental Impact Statement.

W.1. Introduction

W.1.1. Purpose

1. The purpose of this Water Resources Management Plan (Plan) is to further clarify water quality goals, objectives, and management actions set forth in Table 2.9, "1000 PHYSICAL RESOURCES (PR) – WATER" (p. 131) of the Proposed Resource Management Plan (RMP) and Final Environmental Impact Statement (EIS). This Plan describes water resources management, and outlines specific requirements for proponents of projects that have the potential to produce water as a by-product or waste which could impact water resources within the planning area. Where applicable, this Plan refers to the goals and objectives found in Table 2.9, "1000 PHYSICAL RESOURCES (PR) – WATER" (p. 131) of the Proposed RMP and Final EIS.

2. This Plan may be modified as necessary to comply with law, regulation, and policy and to address new information and changing circumstances.

W.1.2. Authority for Water Resource Management

1. **Federal Land Policy and Management Act of 1976**. Federal Land Policy and Management Act (FLPMA) provides Bureau of Land Management's (BLM) basic operating authority. It establishes a unified, comprehensive, and systematic approach to managing and preserving public lands in a way that protects "the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values." FLPMA directs that in developing and revising its RMPs, the BLM shall provide for compliance with applicable water pollution control laws, including state and federal pollution standards or implementation plans.

2. **Clean Water Act of 1972**. The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Under the CWA, United Stated (U.S.) Environmental Protection Agency (EPA) has implemented pollution control programs such as setting wastewater standards for industry and water quality standards for all contaminants in surface waters. The CWA made it unlawful to discharge any pollutant from a point source into navigable waters, unless a permit was obtained. EPA's National Pollutant Discharge Elimination System (NPDES) permit program controls discharges. Point sources are discrete conveyances such as pipes or man-made ditches. Industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters (EPA 2013c).

The Wyoming Department of Environmental Quality (DEQ) Water Quality Division (WQD) has been delegated authority by the EPA to implement federal programs of the CWA. The Wyoming DEQ WQD is responsible for managing water quality through the Wyoming Water Quality Rules and Regulations and the Wyoming State Implementation Plan. In accordance with revisions to

Chapter 2 of the Wyoming Water Quality Rules and Regulations the state program name, NPDES, was changed to the Wyoming Pollutant Discharge Elimination System (WYPDES). This change clarified that the Wyoming DEQ is the permitting authority for surface discharges within the state. BLM's authority relating to water discharges is described in Onshore Oil and Gas Order No. 7; Disposal of Produced Water. **Approval by the Wyoming DEQ, Wyoming Oil and Gas Conservation Commission (WOGCC) or EPA is not considered as granting approval for discharge or disposal from a federal mineral action until and unless BLM approval is obtained.**

In 1990, the EPA published regulations requiring all storm water discharges associated with industrial facilities to obtain storm water discharge permits. In Wyoming, where the Wyoming DEQ is the permitting authority, Chapter 2, Section 6, of the Wyoming Water Quality Rules and Regulations requires permits for storm water discharges from all construction activities disturbing 1 or more acres. The type of facility being constructed does not change the requirement to obtain permit coverage. As such, construction of oil and gas facilities requires storm water discharge permits from the Wyoming DEQ.

Section 404 of the CWA requires approval prior to discharging dredged or fill material into waters of the United States, including wetlands. Any person or entity planning to work in waters of the United States, or dump or place dredged or fill material in waters of the United States, must first obtain a permit from the U.S. Army Corps of Engineers. Prior to issuing a permit, the U.S. Army Corps of Engineers must be presented with a certification from the state that the proposed project will not result in a violation of the state's water quality standards. This is referred to as a CWA Section 401 certification and is provided by the Wyoming DEQ, WQD.

3. **Resource Conservation and Recovery Act of 1976**. The Resource Conservation and Recovery Act gives EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. Resource Conservation and Recovery Act also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to Resource Conservation and Recovery Act enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances.

4. **Safe Drinking Water Act of 1974**. The Safe Drinking Water Act is the main federal law that ensures the quality of Americans' drinking water. Under Safe Drinking Water Act, EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards. Authorities under the Safe Drinking Water Act reside with EPA; they have not been delegated, except in limited cases, to the State of Wyoming. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells.

5. **National Environmental Policy Act**. The National Environmental Policy Act (NEPA) establishes a public, interdisciplinary framework for federal decision-making and ensures that the BLM and other federal agencies take environmental factors into account when considering federal actions. The BLM uses the NEPA process to analyze potential impacts of its proposed actions on water and other resources and to consider appropriate measures to mitigate adverse impacts.

6. **Powder River Basin Final Environmental Impact Statement and Record of Decision.** The Powder River Basin (PRB) Final EIS and Record of Decision (ROD) for the PRB Oil and Gas Project (BLM 2003c) is a programmatic document that provides guidance for managing BLM-administered oil and gas activities with the PRB. The analysis and decision document

included a description of the management goals, objectives, management actions, and conditions of use that guide future management of oil and gas operations on public lands and federal mineral estate managed by the BLM within the Buffalo planning area.

The PRB Final EIS ROD is not the final approval for the action proposed within the PRB oil and gas area. A separate authorization is required from BLM (or other permitting agency such as U.S. Forest Service [USFS]) prior to approval of any application for permit to drill (APD), Plan of Development (POD), Sundry Notice, Right-of-way (ROW) Grant or Special-Use Permit before any construction can occur. (BLM 2003c) Prior to the approval of an application, additional site-specific NEPA analyses would most likely be required.

The ROD requires that the operator of a coalbed natural gas (CBNG) project include a water management plan that addresses the handling of produced water during the testing and production of CBNG wells as part of the submission of APDs or PODs. The water management plan must provide adequate information for the BLM to complete site-specific NEPA analysis.

Water disposal for conventional oil and gas must conform with 43 Code of Federal Regulations (CFR) 3160 Onshore Oil and Gas Order No. 7; Disposal of Produced Water. For water management under this order, the operator must submit a sundry request which identifies the water quality to be disposed, type of disposal facility (well, pit, evaporation pond, etc.), method of transport to the disposal facility, and proof of authorization for that facility through the pertinent state agency (Wyoming DEQ or WOGCC).

Under both FLPMA and the CWA, the BLM cannot authorize any activity which does not comply with all applicable local, state, tribal, and federal air quality laws, statues, regulations, standards, and implementation plans.

W.1.3. Background and Current Conditions

Preparation of the Analysis of the Management Situation in 2009, as well as the PRB Final EIS disclosed that extensive energy development within the planning area, especially coal and fluid minerals, could lead to water quality and quantity impacts. Since the production of CBNG requires that the coal zone pressure be reduced to the point of gas evolution and water management was identified as one of the major issues, there was extensive surface and groundwater analysis included in the NEPA assessment for the PRB Final EIS.

Establishment of baseline conditions and monitoring selected representative water components, such as water level, quality and flow rates, can continue to characterize changes over time.

W.1.3.1. Water Baseline

Surface Water

The PRB Final EIS ROD selected water management from Alternative 2A to reduce the volume of produced water that would reach basin mainstems and their tributaries in the PRB, reducing the potential for adverse effects on surface water quality. The Powder River, Little Powder River, and Tongue River watersheds are heavily used by downstream irrigators. Alternative 2A emphasized infiltration and storage of the produced waters in shallow aquifers for local beneficial use. Historic flow rates for the mainstems were summarized in the PRB Final EIS, Table 3-8, page 3-41. Data from 2001 through 2011 is presented below in Table W.1, “Monthly

Mean Discharge (cubic feet per second) 2001 to 2011" (p. 2627) and further discussed in the *Water Resources* section of Chapter 3.

Table W.1. Monthly Mean Discharge (cubic feet per second) 2001 to 2011

Year	January	February	March	April	May	June	July	August	Septem-ber	October	November	December
Upper Powder River												
2001	118	101	408	189	140	61.2	232	2.4	0	38.2	92.2	65.3
2002	55.8	76.6	197	274	188	34.1	60.6	139	111	95.6	198	87.2
2003	97.8	112	360	375	344	301	76.8	10.3	17	40.9	89.4	102
2004	65.3	109	244	147	131	31.6	77.8	8.3	0.51	64.1	114	110
2005	151	192	132	176	683	383	70.7	42.2	0.26	80.8	111	81
2006	135	126	271	222	270	84.7	14.7	3.41	24.8	83.6	97.3	78.4
2007	64.8	80.3	267	342	688	440	208	84.8	25.8	104	136	94
2008	98.1	132	318	184	1,561	1,321	319	50.7	69.5	129	173	88.6
2009	131	293	347	472	439	338	189	144	73.4	184	182	57.1
2010	65.7	141	264	439	1,111	1,055	264	70	33.9	94.4	160	137
2011	96.2	171	299	217	1,059	1,984	399	71	75	174	174	106
Monthly Mean	105	139	283	276	601	549	174	57	39	99	139	91
Middle Powder River												
2001	139	144	294	230	177	93	173	2.57	7.65	55.2	127	134
2002	196	237	185	312	181	67.2	53.8	250	185	160	190	131
2003	154	201	588	578	574	666	155	26.3	64	79	91.3	157
2004	56.6	76.4	368	212	124	31.1	117	33.3	58.1	162	222	142
2005	136	158	199	242	1,389	975	227	151	47.3	163	175	107
2006	196	173	339	323	315	126	10	0.97	45.8	118	180	86.5
2007	83.4	71.8	288	427	1,183	1,156	281	161	138	199	233	182
2008	93.9	158	540	292	2,514	3,204	1,030	92.2	148	250	289	191
2009	213	412	641	757	859	968	429	272	104	322	306	165
2010	180	248	419	513	1,430	2,013	548	116	60.6	149	233	216
2011	216	225	461	360	1,616	3,702	1,224	134	93.4	242	293	275
Monthly Mean	151	191	393	386	942	1,180	386	113	86	173	213	162
Belle Fourche River												
2001	3.62	4.37	37.8	29.8	14.7	28.4	7.23	2.56	2.46	5.02	6.13	6.3
2002	2.41	4.7	14.1	39.2	23.9	22.1	3.77	15.7	5.98	5.14	7.27	4.89
2003	5.15	6.86	100	14.2	14	79.7	9.99	2.21	4.93	4.73	6.05	5.57
2004	3.61	12.9	11.9	6.72	4.24	1.67	16.3	2.32	1.45	2.51	6.4	3.43
2005	4.37	7.49	9.29	20.7	53.4	8.73	1.56	4.35	1.06	4.65	3.6	5.51
2006	6.5	5.56	9.49	7.05	15.9	3.02	0.17	2.87	3.61	3.86	5.11	3.21

Year	January	February	March	April	May	June	July	August	Septem-ber	October	November	December
2007	1.87	9.8	37.2	42.9	116	59.3	3.84	2.83	3.23	4.25	2.93	3.11
2008	2.84	8.57	49.9	13	173	101	15.2	5.88	6.67	9	8.35	4.21
2009	8.53	32.8	25.4	111	18.1	14.6	12.5	9.05	4.22	8.43	9.47	5.72
2010	4.09	8.44	26.2	18.3	63.3	41.9	10.4	6.76	2.39	3.7	5.17	3.14
2011	3.5	64	147	30.4	282	109	18.5	7.93	7.34	8.92	11.9	7.28
Monthly Mean	4.2	15	43	30	71	43	9	5.7	3.9	5.4	6.6	4.8
Cheyenne River												
2003	-	-	-	-	-	-	-	-	-	0.06	0.09	0.08
2004	0.05	0.02	0.29	0.14	0.22	0.07	0.01	0	0	0	0.02	0.03
2005	0	0.06	0.15	1.84	7.98	28.6	4.35	6.36	0.68	0.28	0.56	0.04
2006	0.01	0	0	0.16	0.07	1.07	0	27.8	0.05	0.02	0.05	0.21
2007	0.13	0.04	5.71	2.91	56.2	1.6	0.92	3.79	0.02	0.03	0.62	0.17
2008	0	0.05	0.77	0.27	267	39	35.2	3.74	0.14	0.07	0.15	0.1
2009	0.02	4.3	1.18	52.8	14.3	25.4	53.3	10.3	0.2	0.35	0.32	0.17
2010	0.04	0.01	11.9	12.1	168	123	33.5	3.87	0.93	7	3.41	2.36
2011	2.86	182	330	36	86.9	67.6	24.5	5.79	2.12	1.72	2.59	1.72
Monthly Mean	0.39	23	44	13	75	36	19	7.7	0.52	1	0.87	0.54
Clear Creek												
2003	-	48.9	117	142	195	235	60.5	20.6	53.9	52.7	66.8	56.3
2004	48.5	60.3	74.3	71.1	5.61	1	42.4	15.3	53.6	86.7	62.7	70
2005	59.7	75.1	62.7	70.8	650	511	159	115	45.5	93.3	92.3	64.3
2006	91.4	64.8	87.9	137	87.9	25	1.63	0.77	19.2	48.6	59.2	52.7
2007	45.2	44.3	103	102	495	704	92.8	20.7	101	106	94.2	72.4
2008	62.6	72.6	167	95.5	901	1466	478	24.9	71.6	113	102	59.1
2009	75	124	140	199	371	608	253	89	33.2	130	131	59.7
2010	59.9	57.9	105	93.5	392	1,124	258	37.3	26.8	63	77.3	64.5
2011	79.6	89.9	151	142	580	1,616	678	47.6	26.9	104	114	102
Monthly Mean	65	71	112	117	409	699	225	41	48	89	89	67
Crazy Woman Creek												
2001	17.2	12.5	36.8	12.5	8.57	6.58	74.1	0.29	0.06	0.1	3.19	8.62
2002	5.61	7.94	14.6	20.5	7.09	4.18	8.08	14.4	1.87	4.05	12.2	11.4
2003	10	13	30.3	53.1	84.9	125	31.7	2.41	4.2	5.21	12.7	15.3
2004	8.65	15.4	27.5	8.76	5.5	1.78	12.3	0.95	0.11	3.94	10.8	13.9
2005	10.2	13.4	11.2	20.6	174	168	38.2	11.4	1.37	10.2	13.3	8.73
2006	14.8	11.3	18.6	13.9	7.73	2.05	0.01	0.02	0.02	0.05	0.45	1.04

Year	January	February	March	April	May	June	July	August	Septem-ber	October	November	December
2007	0.64	3.5	15.5	11	29.4	48.4	14.1	3.9	0.11	4.29	9.22	6.48
2008	7.58	17.6	28.2	13	258	424	88.8	13.8	12.7	18	22.9	13.4
2009	14.3	35.4	52.3	58.1	33.6	102	52.5	28.7	11.9	21.5	19.5	12.1
2010	7.97	12.8	20.3	52	151	328	86.1	15.8	2.54	4.3	17.3	13.7
2011	15.4	19.3	25.5	20.1	163	580	145	22.6	13.5	23	22.8	20.1
Monthly Mean	10	15	26	26	84	163	50	10	4.4	8.6	13	11
Tongue River												
2001	172	200	233	203	323	176	54.7	13.1	73.3	117	126	107
2002	78.7	79.8	88.5	147	268	354	83.3	78.1	128	148	136	122
2003	145	145	443	307	971	1264	287	69.9	168	174	180	144
2004	129	150	169	159	192	181	150	63.5	104	157	139	116
2005	93.9	86.1	124	158	1,703	1,527	384	180	162	215	169	139
2006	145	134	154	213	499	324	40.6	21.2	106	181	161	122
2007	104	97.1	348	496	2,176	2,203	290	128	164	244	185	151
2008	152	165	244	214	1,453	2,761	940	181	265	264	244	195
2009	226	221	279	551	928	1,655	507	268	201	254	216	149
2010	140	145	219	261	1,033	2,322	516	115	174	185	176	164
2011	161	212	243	281	1,688	3,659	1,454	311	211	310	268	221
Monthly Mean	141	148	231	272	1,020	1,490	428	130	160	204	182	148
Source: USGS 2013												

The PRB Final EIS disclosed existing water quality and quantity conditions around the basin as of 2001 (see PRB Final EIS pgs. 3-36 to 3-53). Surface water quality in the planning area is generally affected by depletions and return flows from irrigation. Surface water withdrawals in the planning area are used to support agricultural, domestic, and stock water uses. Prior to 2000, irrigation use accounted for about 95 percent of the surface water withdrawals in the planning area. Existing water quality of the mainstems is monitored by the U.S. Geological Survey (USGS) at numerous locations throughout the basin.

Parameters of primary interest include the electrical conductivity (EC) which is an manifestation of the concentration of solids dissolved in the water or salinity; Sodium Adsorption Ratio (SAR) which represents the proportion of sodium ions to calcium and magnesium ions in water and suspended solids or sediment which is the result of erosion or sediment movement. Concentrations of suspended solids are high throughout the planning area which is reflective of the highly erosive nature of the shale deposits through which the rivers flow. SAR is an indicator of the potential for water to affect soil structure when used for irrigation (PRB Final EIS pgs. 3-47 to 3-48).

Surface discharge water quality is regulated by Wyoming DEQ through WYPDES permits. These permits establish discharge water quality criteria which specify maximum concentrations of pollutants which may be discharged into surface waters of the state. Concentrations permitted are based on the location of the discharge point with respect to the waters of the state, the volume to be discharged, and the quantity and nature of the pollutants. Any project subject to BLM approval would require compliance to state requirements. However, approval for discharge by the Wyoming DEQ is not considered as granting approval for a federal mineral action until and unless BLM approval is obtained.

Data published by the USGS (Clark 2012) summarized water quality for four major watersheds in the PRB for the period between the beginning of full scale CBNG development (2001) through peak production (2008) to 2010. The watersheds evaluated are the Powder, Tongue, Belle Fourche, and Cheyenne drainage basins. Clark concluded that CBNG developments may have contributed to some trends in the PRB, with upward trends (concentration of constituents) noted at some locations, and downward trends (dilution of constituents) noted at other locations.

Impaired Water Bodies

The quality of water in the rivers and streams within the planning area is protected for designated uses in accordance with the State of Wyoming's water quality standards. Section 303(d) of the CWA requires the state to develop a listing of all waters of the state that are impaired and do not fully support existing or designated uses. The most recent listing was issued in 2012. See the *Water Resources* section in Chapter 3 for a more complete discussion. Most sources of the impairments are unknown, although some have been attributed to agricultural practices as well as natural background sources.

Belle Fourche River Basin

Primary land uses in the Belle Fourche River Basin are livestock grazing, hay production, and mineral extraction. Mineral extraction includes rare earth, bentonite and coal mining, oil and gas, and CBNG development. There are two distinct topographic regions in this basin, the rolling plains of the Powder River geologic basin in the west and the Black Hills uplift in the east. Most streams originating in the plains are naturally intermittent; however, discharges from coal mines, CBNG production, and the City of Gillette provide perennial flow to Donkey Creek, portions of

the Belle Fourche River and several other plains streams. There are no BLM-administered lands associated with any impaired water bodies in the Belle Fourche River Basin.

The Belle Fourche River headwaters originate in the plains south of Gillette. The river flows northeast past the Bearlodge Mountains, where it then turns to the southeast and flows into South Dakota. South Dakota's 2008 303(d) list included the Belle Fourche River from the Wyoming and South Dakota state lines downstream to Fruitdale, South Dakota, for fecal bacteria and total suspended solids. The South Dakota Department of Environment and Natural Resources completed a Total Maximum Daily Load (TMDL) for total suspended solids on the Belle Fourche River in early 2005. The TMDL concluded that the most significant source of sediment in the river is likely from stream incision and bank failure. The South Dakota Department of Environment and Natural Resources has also completed a TMDL for fecal coliform. Bacterial source tracking used in the study provided no direct evidence that humans, livestock, or wildlife are fecal coliform sources for this segment of the Belle Fourche River.

Upper Belle Fourche Sub-basin

The Upper Belle Fourche Sub-basin includes those waters upstream of the confluence of Beaver Creek with the Belle Fourche River. Coal and CBNG development are important land uses in the western portion of the sub-basin, while logging, wildlife habitat, and recreation are common land uses in the Black Hills to the east. Livestock grazing and hay production are common land uses throughout this sub-basin.

Gillette is the fourth largest community in Wyoming and lies at the headwaters of the Donkey Creek drainage. Monitoring by Wyoming DEQ (2012b) and Campbell County Conservation District (CCCD) indicate that the contact recreational use of Donkey Creek is impaired due to exceedances of the fecal bacteria criterion, from the confluence with the Belle Fourche River upstream 61.4 miles to Brorby Boulevard within the City of Gillette. Stonepile Creek, a tributary to Donkey Creek, is also on the 303(d) list for not supporting its contact recreation uses. Data from the 2008 Little Powder River and Belle Fourche Drainages Watershed Implementation Section 319 Project show that this impairment extends from the confluence with Donkey Creek upstream to the junction of Highways 14/16 and 59. The plan will likely be updated following completion of the Belle Fourche River TMDL. Implementation strategies will focus on septic system improvements, education of urban and rural residents, urban sewage treatment, storm water runoff, solid waste management, small acreage land use management, and rural development issues. CCCD completed a Section 319 project in 2010, which included data spanning 2007 to 2009. These data indicated that *Escherichia coli* (E. coli) concentrations at nearly all sampling sites along the currently listed segments of Stonepile and Donkey Creeks exceeded the state's primary recreational use criterion. The study also found elevated chloride and ammonia concentrations in both creeks, but because neither is classified as a fishery, the state's aquatic life acute and chronic chloride standards do not apply. The Campbell County Natural Resource District also completed a Section 319 project in 2010 for the upper Belle Fourche River Watershed, which included data spanning 2005 to 2009. Multiple E. coli samples during the sampling period showed that Donkey Creek exceeds the primary contact recreational use criterion from the confluence with the Belle Fourche River upstream to the Campbell County line. E coli samples were also collected from the Belle Fourche River from the Campbell County line to below the outfall of the Hulett wastewater treatment facility that showed exceedances of the primary contact recreational use criterion. The study reported no chloride concentrations exceeding of the chronic aquatic life other than fish criterion on the Belle Fourche River. However, USGS data indicate that exceedances of the chronic chloride criterion continue to occur.

Gillette Fishing Lake is currently on the 303(d) list for sediment and phosphate impairments. The source of these pollutants was investigated by CCCD, and data suggested that storm water from the City of Gillette was the primary source. CCCD, in cooperation with the City of Gillette, has developed a Water Quality Improvement Plan to address these two impairments. Corrective actions have been initiated by the City of Gillette.

Wyoming DEQ currently identifies three segments of the Belle Fourche River as having impaired contact recreation uses. Of these, only sections of Donkey Creek and Stonepile Creek are within the planning area. Two TMDLs were initiated in 2009 for the upper Belle Fourche watershed 303(d) listings within the planning area. These are for bacterial impairments and fecal coliform listings on Donkey and Stonepile Creeks.

Cheyenne River Basin

The Cheyenne River Basin includes the southeast portion of the planning area, in east-central Wyoming and drains areas of the Powder River geologic basin and southern portion of the Black Hills uplift. Besides the southern Black Hills and some breaks and escarpments, most of the basin consists of rolling high plains. The Thunder Basin National Grasslands occupy a large portion of the central part of this basin. Primary land uses are livestock grazing, hay production, coal mining, oil and gas production, and some CBNG production. These activities occur primarily in the western portion of the basin. Lowland streams are usually intermittent or ephemeral, and most perennial streams originate in the Black Hills or Pine Ridge escarpment. Because the sedimentary rocks in the Powder River geologic basin contribute elevated levels of iron, manganese, and sulfate to surface waters, several streams have had their secondary (aesthetic) drinking water criteria removed for iron and manganese. There are no BLM-administered lands associated with any impaired water bodies in the Cheyenne River Basin.

Antelope Creek Sub-basin

The northern portion of the Antelope Creek Sub-basin of the Cheyenne River Basin lies within the planning area. The headwaters of the Antelope Creek Sub-basin are east of Edgerton. Land uses are primarily grazing and oil production, along with coal mining in the northeastern third of the sub-basin. Antelope Creek contains many beaver dam complexes in its lower reaches which store water, keeping it from reaching the Cheyenne River except during high flow periods. Concentrations of dissolved iron in Antelope Creek occasionally exceed the aquatic life other than fish chronic criterion; however, this is likely due to the natural geology and spring dominated hydrology. Wyoming DEQ (2007) monitoring indicated that the benthic macroinvertebrate community of Antelope Creek is comparable to reference condition for intermittent streams in this basin and is supporting its aquatic life other than fish use. There are no BLM-administered lands associated with any impaired water bodies in the Antelope Creek Sub-basin.

Upper Cheyenne Sub-basin

The Upper Cheyenne Sub-basin is the northeastern portion of the Cheyenne River Basin within the planning area. Coal mining occurs in the Upper Cheyenne Sub-basin east of Wright. Other land uses include grazing and oil and gas development. The Cheyenne River in this sub-basin typically has an intermittent flow regime, with flows reduced to standing pools of water fed by springs during the drier seasons. Assessment by Wyoming DEQ (2007) indicates that the Cheyenne River in this sub-basin, from Lance Creek upstream to the Dry Fork of the Cheyenne River, fully supports its fisheries and aquatic life other than fish uses and contains a diverse

assemblage of benthic macroinvertebrates and fish. There are no BLM-administered lands associated with any impaired water bodies in the Upper Cheyenne River Sub-basin.

Little Thunder and Black Thunder Creeks are ephemeral or intermittent with some perennial spring-fed pools and those created by beaver dams. Although Little Thunder Creek receives some discharge from oil treater and CBNG production, most is lost to evaporation and infiltration, or is stored within beaver dam complexes before reaching Black Thunder Creek. Wyoming DEQ (2007) found that the benthic macroinvertebrate community in Black Thunder Creek is comparable to the reference condition for similar intermittent streams and that it is fully supporting its aquatic life other than fish use.

Little Missouri River Basin

In Wyoming, the Little Missouri Basin includes only the Little Missouri Sub-basin. Only small portions of the Little Missouri Basin fall within the extreme east-northeast part of the planning area.

Area land uses include livestock grazing, dry land and irrigated farming, bentonite mining in the lower drainages, and oil production in the upper drainages. Streamflow is often intermittent, but pools typically persist, even during dry periods. Concerns with turbidity, siltation and flow alteration in the Little Missouri and the North Fork Little Missouri have been identified by Crook County Natural Resource District. However, bentonite clays often remain suspended in water and therefore, a certain degree of turbidity is natural. Approximately 500 acres of abandoned bentonite mine lands have been reclaimed by Abandoned Mine Land in the basin, although bentonite mining continues in the area.

Powder River Basin

The Powder River flows north from central Wyoming into Montana. Nearly all of the naturally perennial streams which reach the Powder River originate in the Big Horn Mountains. The Big Horn Mountains are composed of igneous and metamorphic rocks flanked by well-indurated sedimentary rocks. The water quality of these mountain streams is generally high, except in areas where land use practices have led to excessive erosion and sediment loading. In the lowlands of the Powder River geologic basin, the geology primarily consists of fine-grained sedimentary strata which are easily erodible and often high in dissolved constituents. Streams that originate in basin terrain are generally ephemeral and flow only in response to snowmelt or rainfall events unless receiving discharge water from industry (e.g., CBNG). These streams are generally high in dissolved solids and are often naturally turbid. Due to these conditions, site-specific criteria have been adopted and numeric secondary human health criteria for manganese and iron do not apply to most Class 2 waters originating in the basin. Wyoming DEQ, Wyoming Game and Fish Department (WGFD), and U.S. Fish and Wildlife (USFWS) have concerns about how aquatic communities may be affected by CBNG development, but the effects of development on aquatic biota are unknown. WGFD biologists and a University of Wyoming graduate student recently surveyed the basin from 2004 to 2008. Survey data confirmed that the Powder River still hosts the most diverse fish assemblage of any Wyoming river basin. However, biologists also noted the near absence of the sturgeon chub, a species that was common in the Powder River in the mid-1990s. Of the 16.4 miles of impaired water bodies in the planning area in 2012, 14.1 of them are within the PRB.

Middle Fork Powder Sub-basin

The headwaters of the Middle Fork Powder River flow through a steep canyon with little potential for disturbance. Wyoming DEQ data indicate that the Middle Fork Powder River above Buffalo Creek and Rock Creek, an upper tributary, fully support their aquatic life other than fish uses. Blue Creek and upper Beaver Creek were also assessed by Wyoming DEQ and fully support their aquatic life other than fish uses (Wyoming DEQ 2012).

Beartrap Creek is a spring-fed tributary of Red Fork. Historically, the upper Beartrap Creek drainage has been used as a stock driveway and holding ground. However, management practices have changed over the past 20 years, and livestock now have limited access to streams, are moved through relatively quickly, and are only in the drainage for a short period in spring and fall. Log spill structures were installed by BLM and WGFD in 1989 to create additional pool and riffle habitats. Monitoring by Wyoming DEQ shows that both upper Beartrap Creek and Sawmill Creek are fully supporting their aquatic life other than fish uses.

Monitoring by Wyoming DEQ (2004a) in 1998 and 2003 indicates that Webb Creek, a Class 2AB tributary to the North Fork Powder River, is fully supporting its aquatic life other than fish uses.

Upper Powder River Sub-basin

The Upper Powder Sub-basin encompasses most of the drainages into the Powder River mainstem from the confluence of the North and Middle Forks downstream to the confluence of the Powder River and Clear Creek. Primary land uses are livestock grazing and oil and gas production. Except for the mainstem reaches, most reaches in this semi-arid sub-basin are non-perennial.

The Powder River got its name from the large amounts of very fine sediment it naturally carries. Sturgeon chub, a native fish considered rare by WGFD and now found only in the Powder River in Wyoming, is believed to be adapted to, and actually require, turbid water.

Monitoring by Wyoming DEQ in 1998 showed that Pumpkin Creek was an ephemeral or intermittent stream and was supporting its aquatic life other than fish uses. However, CBNG development has since progressed through the watershed. As part of the Wyoming DEQ's watershed based permitting process, physical data were collected in the Pumpkin Creek drainage (Wyoming DEQ 2012) to determine how much additional flow from CBNG discharges the drainage could accommodate without physically degrading. This monitoring showed that parts of the drainage now have perennial flows that reach the Powder River and identified areas of severe erosion and active headcutting. The 1998 data collected by Wyoming DEQ can no longer be considered representative of current conditions, and it is unknown whether Pumpkin Creek is fully supporting its aquatic life other than fish uses. Fortification Creek was also monitored by Wyoming DEQ in 1999 (Wyoming DEQ 2004a) and showed full support of the aquatic life other than fish use. Ninemile (Wyoming DEQ 2007) and Fourmile (Wyoming DEQ 2007) Creeks, located near Sussex, are ephemeral Class 3B tributaries to the Powder River. Dikes and other small impoundments trap sediment and help support riparian vegetation. Assessments by Wyoming DEQ indicate that aquatic life other than fish uses are supported in these watersheds.

Analysis of chloride data in the PRB shows that the majority of chloride loading in the Powder River comes from Salt Creek. The Powder River below Salt Creek was added to the 1998 303(d) list for exceedances of the chloride criteria, which was 230 mg/L at that time. Although the Powder River below Salt Creek now has a site-specific chloride criterion of 984 mg/L, because chloride concentrations occasionally exceed this criterion at the USGS sampling site near Sussex, the Powder River has remained on the 303(d) list for chloride. Although Salt Creek does not appear to exceed its site-specific chloride criterion of 1,600 mg/L, a TMDL or watershed-based

plan on the Powder River will need to address loading from Salt Creek. Data collected on the Powder River at the Sussex USGS station also showed exceedances of the state's aquatic life other than fish chronic selenium criterion and it was added to the 2000 303(d) list. Data collected on the Powder River and its tributaries while monitoring CBNG development in the basin have indicated that the selenium impairment extends from the confluence with the South Fork Powder River downstream to the confluence with Crazy Woman Creek. The relatively low selenium concentrations found in Crazy Woman Creek apparently dilute the Powder River at this point and enable the river to meet the aquatic life other than fish chronic selenium criterion. Historic USGS and Powder River Conservation District data indicate that the primary source of the selenium may be the South Fork Powder River drainage, but Salt Creek also occasionally has high concentrations and contributes to the loading in the Powder River. It is unknown whether the selenium loading to the Powder River is natural or anthropogenic. Data collected by the USGS show that the Powder River exceeded the total arsenic criterion protective of drinking water use between the sampling site near Sussex downstream to the Arvada site during 2009 and 2010 and two segments of the river have been added to the 2012 303(d) list for this pollutant. Data from the USGS Salt Creek sampling station indicate that this tributary contributes arsenic to the Powder River, but the source of arsenic within the Salt Creek watershed is unknown.

CCCD monitored portions of this sub-basin under a Section 319 Project. Results indicated exceedances of the fecal bacteria criterion in the lower reach of the Middle Prong of Wild Horse Creek, and this water was added to the 303(d) list in 2006 from its confluence with Wild Horse Creek to a point 4.6 miles upstream. CCCD and Natural Resources Conservation Service (NRCS) have assisted landowners in implementing 13 water quality improvement projects in the watershed, but the effects of these actions on water quality is unknown. Local stakeholders and CCCD initiated watershed planning in this watershed in 2007 (Wyoming DEQ 2012). CCCD completed a Section 319 Project in 2010, which included data spanning 2007 to 2009. Data indicated that E. coli concentrations in 2008 and 2009, continued to exceed the primary recreational use criterion.

South Fork Powder Sub-basin

The South Fork Powder Sub-basin lies mostly in Natrona County, and extends into the Waltman area. The most downstream portions of the sub-basin lie within the planning area. Livestock grazing and oil and gas development are the primary land uses. The few perennial stream reaches in this sub-basin are primarily in the Rattlesnake Hills for the Wallace Creek headwaters, the lower portions of Willow Creek, which partially lies within the planning area, and Cottonwood Creek, and the lower portion of the mainstem of South Fork. Cave Gulch and Okie Draw, tributaries to the South Fork Powder River, have perennial flow due to oil field discharges.

Data collected by USGS and Powder River Conservation District have showed exceedances of the aquatic life other than fish chronic selenium criteria on Willow Creek from the confluence with the South Fork Powder River to a point 10.5 miles upstream, and it was placed on the 303(d) list in 2006. Further monitoring by Powder River Conservation District showed that both Posey and Murphy Creeks, each tributaries to the South Fork Powder River immediately downstream of the Willow Creek confluence, also exceed the aquatic life other than fish chronic selenium criterion and were added to the 2008 303(d) list. The source of the selenium for both creeks appears to be related to the natural geology of the area, but additional loading from anthropogenic sources may also occur in the Posey Creek watershed, as lands are irrigated and selenium is dissolved from marine shales. Another possible source may be oil treater discharges.

Salt Creek Sub-basin

Most downstream portions of Salt Creek are within the planning area. The towns of Midwest and Edgerton are near the center of the Salt Creek Sub-basin but are outside of the planning area. Land uses are primarily livestock grazing and oil and gas production. Soils of the area have developed from fine-grained sandstone and calcareous shales, are dry, and easily eroded by wind or water.

Several natural oil seeps have been documented along Salt Creek in the Midwest area, which prompted the development of the oil fields beginning in 1908. While most reaches in this semi-arid sub-basin are non-perennial, Salt Creek now has perennial flow due to oil treater discharges. Even prior to these discharges, the creek naturally carried a high load of salts; however, studies conducted by Powder River Conservation District have confirmed that the vast majority of perennial flow and chloride loading are from oil production discharge water. High chloride concentrations in the creek exceed Wyoming's aquatic life other than fish chronic criteria, and thus it was added to the 303(d) list. A Use Attainability Analysis proposing a site-specific chloride criterion of 1,600 mg/L for Salt Creek has been approved, and because there have been no exceedances of this criterion, chloride has been removed from the 303(d) list as a cause of impairment on Salt Creek. However, since Salt Creek is the primary contributor of chloride loading to the Powder River, any TMDL or watershed-based plan on the Powder River will need to address loading from Salt Creek. Data collected as part of the chloride Use Attainability Analysis on Salt Creek showed exceedances of the chronic aquatic life other than fish criterion for selenium, and this pollutant was added on the 303(d) list in 2008. It is unknown whether the primary source of this selenium exceedance is natural or anthropogenic, but both of these sources are likely contributors. Salt Creek was also added to the 303(d) list of threatened waters in 1996, due to the regular occurrence of oil and produced water spills in the watershed. Most of the oil field infrastructure dates to the 1960s and spills have been primarily due to a combination of the age of the infrastructure and bacterial corrosion in the injection lines. Most spills have been contained before they enter Salt Creek. At the request of Wyoming DEQ, the current operator has developed a long-term upgrade and maintenance plan for the field to reduce the potential for large spills that may affect water quality. The operator is also phasing into carbon dioxide flood injection to enhance oil recovery, which will also reduce spills because it requires the replacement of both injection and production lines. Lastly, a biocide treatment has been added to many water flood lines since 2003 to reduce bacterial corrosion.

Crazy Woman Sub-basin

The headwaters of the Crazy Woman Sub-basin are on the eastern slope of the Big Horn Mountains. Land uses are primarily oil and gas development, recreation, grazing, and irrigated agriculture.

The North Fork Crazy Woman Creek was added to the 1996 303(d) list due to water quality threats from habitat degradation, nutrients and bioindicators. A mistake was made in the listing process when bioindicators was added as a cause and it has thus been removed from the 2012 303(d) list. Several Section 319 projects have been conducted in this watershed, resulting in changes to both irrigation and livestock grazing practices in many areas. Considerable water quality data have been gathered in this watershed; however, it remains uncertain whether these practices are effective because effectiveness monitoring of the implemented best management practices (BMPs) has been inconsistent (Wyoming DEQ 2012). Wyoming DEQ (2012b) has conducted monitoring in the watershed, but the effectiveness of the above Section 319 Project

BMPs in improving physical degradation was not examined. A Wyoming DEQ summary report, including a use support determination for North Fork Crazy Woman Creek, is expected in 2012.

The EPA has established National Secondary Drinking Water Regulations that set water quality standards for 15 contaminants, including manganese. EPA does not enforce these secondary maximum contaminant levels. Instead, they are intended to serve as guidelines to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color and odor. These contaminants are not considered to present a risk to human health at these secondary maximum contaminant levels (EPA 1992). Wyoming's aesthetic drinking water criterion for manganese is set at the EPA secondary maximum contaminant levels. Crazy Woman Creek exceeds the aesthetic drinking water criterion for manganese, primarily during low flows, but the aquatic life other than fish chronic criterion for manganese has not been exceeded. Lower Crazy Woman Creek was added to the 303(d) list in 2002 for manganese. However, high manganese concentrations are common in streams in the Powder River Structural Basin due to the natural geology (Wasatch and Fort Union Formations), and thus much of the basin does not have a human health criterion for this pollutant in Chapter 1. There are no known sources of anthropogenic manganese in Lower Crazy Woman Creek, and the creek will unlikely ever be used as a drinking water source due to its intermittent hydrology. Lake DeSmet Conservation District requested that the manganese drinking water criterion from Crazy Woman Creek be removed by Wyoming DEQ.

Several other streams in this watershed have been monitored by Wyoming DEQ and are fully supporting their aquatic life other than fish uses. These streams include: Crazy Woman Creek (from confluence of North and Middle Crazy Woman Creek to approximately 2 miles below Wallows Creek), Little North Fork Crazy Woman Creek, Pole Creek, Poison Creek, Middle Fork Crazy Woman Creek, Doyle Creek, South Fork Crazy Woman Creek, Beaver Creek, and Billy Creek.

Clear Creek Sub-basin

The headwaters of Clear Creek, Piney Creek and Rock Creek are in granitic geology in the Cloud Peak Wilderness within the Bighorn National Forest. Recreation, livestock grazing, and logging are land uses within the mountains, while livestock grazing, oil and gas development, irrigated agriculture, and residential development are the primary land uses at lower elevations. Clear Creek is the last major tributary to join the Powder River upstream of the Wyoming and Montana state lines.

A Section 205j water quality assessment project in Rock Creek and the North and South Fork Shell Creek drainages indicated that these watersheds were threatened by physical degradation of the stream channel and they were added to the 1996 303(d) list. The primary sources of degradation to Rock Creek were identified as heavy livestock grazing in small horse pastures near the stream. Landowners implemented BMPs specifically designed to improve irrigation efficiency. Data indicate that Rock Creek now supports its aquatic life other than fish use and it was removed from the 2004 303(d) list. Impacts to the North and South Fork Shell Creek drainages are primarily due to irrigation diversions and conveyance. Lake DeSmet Conservation District completed a Section 319 Project which addressed these problems, primarily through the installation of more efficient irrigation systems. Biological data collected as part of the project were highly variable across collection dates and were inconclusive. Wyoming DEQ (2012b) monitoring suggests that the BMPs used on the North and South Forks of Shell Creek were somewhat effective, but that additional data were needed. Wyoming DEQ conducted biomonitoring on these streams again in

2006. Several nongame fish were observed while sampling North and South Fork Shell Creeks, suggesting that these streams may be better classified as 2C. Data now indicate full support of the aquatic life other than fish use in these creeks. EPA Section 319 Nonpoint Source Success Stories have been written for both Rock Creek and the North and South Forks of Shell Creek.

In response to citizen concerns of suspected sewage contamination from failed septic systems in surface waters, Wyoming DEQ (2012b) collected E. coli samples in several waters in and near the town of Story. There are no other known sources of fecal contamination in the area. Results showed exceedances of the primary contact E. coli criterion in Dalton Ditch and North Piney Creek. Thus, North Piney Creek from the confluence with Piney Creek to a point 6.4 miles upstream, and Dalton and Piney-Cruse Ditches were added to the 2006 303(d) list. As part of a 2009 Section 205j planning grant, Sheridan County investigated impacts from septic systems on shallow groundwater and the possibility of linkages between potentially contaminated groundwater and surface water in the area. The high E. coli levels recorded in 2005 are considered a potential human health risk. These waters have been posted with health risk warnings and have been prioritized for TMDL development.

A short reach of Hunter Creek was impacted by excessive sediment from an adjacent road and was added to the 1998 303(d) list. Road modifications and changes in maintenance have since been implemented by the USFS to reduce this impact, and subsequent Wyoming DEQ data indicate that the creek fully supports its aquatic life other than fish use. As a result, Hunter Creek was removed from the 2004 303(d) list. A Section 319 Nonpoint Source Success Story has been written for Hunter Creek.

Wyoming DEQ assessment data suggest that Little Piney Creek (Wyoming DEQ 2002) and Boxelder Creek (Wyoming DEQ 2012) support their aquatic life other than fish uses. Wyoming DEQ observed many nongame fish during the assessment of Boxelder Creek, and therefore this creek may be better classified as a nongame fishery. Clear Creek was monitored by Wyoming DEQ (2004a) in 1999, and data indicated full support of aquatic life other than fish uses; however, WGFD records indicate that streamflow alterations may sometimes have an adverse effect on cold water fishes. Several stream restoration projects on Clear Creek have improved the connection between the stream and its floodplain and improved riparian condition. The potential impacts of future CBNG development in the Clear Creek drainage are currently a concern. Wyoming DEQ's CBNG monitoring network is designed to assess these potential impacts.

Wyoming DEQ (2004a) monitoring identified impacts to French Creek from flow augmentation; however, the stream is meeting its aquatic life other than fish use. Although the creek is not currently on the 303(d) list, Lake DeSmet Conservation District has developed a watershed plan as a proactive measure to improve water quality in this watershed.

Middle Powder Sub-basin

The Middle Powder Sub-basin includes the lower portion of the Powder River. Historic land uses have been primarily livestock grazing with some oil and gas development. CBNG development has also become a major land use in much of the sub-basin. Except for the mainstem of the Powder River, reaches in this sub-basin are naturally ephemeral or intermittent. However, many of these streams (e.g., LX Bar, SA, and Fence Creeks) now have perennial flows due to the discharge of CBNG produced water.

Wyoming DEQ monitored the Powder River in 2000, but due to very low streamflows, the absence of reference streams and fluctuating environmental conditions from CBNG development, data

were considered inconclusive. Since 2005, water quality and biological (i.e., macroinvertebrates, fish, and algae) data have been collected as part of a long term, interstate and interagency (e.g., Wyoming DEQ, USGS, and BLM) monitoring program by PRB Interagency Working Group. These data are primarily intended to support an adaptive management approach to CBNG development, but may also be used by Wyoming DEQ to make use support determinations.

Little Powder Sub-basin

The Little Powder River originates near Gillette and flows north into Montana. Primary land uses in the Little Powder Sub-basin include coal mining, CBNG development, and livestock grazing. Moyer Spring is fed by water accumulated in porcelanite (clinker) beds and supports a small brook trout population. Moyer Spring Creek and the Little Powder River are Class 2AB waters, while all other creeks in the sub-basin are Class 3B waters.

Wyoming DEQ monitored the Little Powder River in 1999 and 2005, but aquatic life other than fish use support has not been determined. USGS data collected from the Little Powder River near the Montana border have shown exceedances of the fecal bacteria criterion, and the river was placed on the 303(d) list in 2002. A Section 319 Project sponsored by CCCD reported in 2008 that the impairment extends upstream to the confluence with Spring Creek, and this information has been used to better define the extent of impairment in the 2010 303(d) list from the Wyoming and Montana state lines upstream to the confluence with Spring Creek. CCCD and local citizens have sponsored a watershed plan for the river, and to date, 8 animal feeding operations and 14 septic improvement projects have been implemented (Wyoming DEQ 2012). CCCD completed a Section 319 Project in 2010, which included data spanning 2007 to 2009. These data indicated that E. coli concentrations in 2008 at Soda Well still exceed the primary recreational use criterion. CCCD completed a watershed plan for Little Powder River in 2006.

Tongue River Basin

The Tongue River Basin originates in the Big Horn Mountains west of Sheridan. Land uses within the Bighorn National Forest are recreation, livestock grazing, and logging, while in the lower sub-basin, primary land uses are irrigated agriculture, livestock grazing, and coal mining, with increasing residential and CBNG development. Wohl et al. (2007) reported that many streams within the Bighorn National Forest have been substantially impacted by cattle ranching, irrigated crop production, flow regulation and diversion, and timber harvest. The Tongue River passes through approximately 2.1 miles of BLM-administered land at Welch Ranch north of Sheridan. This section of the Tongue River is impaired for temperature.

Tongue River Sub-basin

Big and Little Goose Creeks were placed on the 1996 303(d) list due to exceedances of the fecal coliform criterion. Subsequent monitoring by Wyoming DEQ in 1998 and 1999 revealed exceedances in several other locations within these watersheds, including Kruse Creek, Sacket Creek, and Jackson Creek irrigation canal, which are all tributaries of Little Goose Creek; Beaver Creek, Park Creek, and Rapid Creek, which are tributaries of Big Goose Creek; and Goose and Soldier Creeks. Sheridan County Conservation District monitored fecal bacteria in the Goose Creek Watershed in 2001 and 2002, and results corroborate the 1998-1999 Wyoming DEQ data (Wyoming DEQ 2012). The Sheridan County Conservation District study also resulted in the extension of the impaired reach of Goose Creek from the confluence of Big and Little Goose Creeks downstream to the Highway 339 bridge crossing, and indicated that McCormick Creek is not meeting its contact recreation uses from the confluence of Little Goose Creek upstream an

undetermined distance. All of the streams listed above are on the 303(d) list. Sheridan County Conservation District, with the guidance of a local watershed steering committee, developed a watershed plan for the Goose Creek watershed, which was approved by Wyoming DEQ in 2005. Implementation projects have begun, including septic system improvements, animal feeding operations, riparian buffer development, stream bank stabilization, reservoir development, and changes in grazing management. A Section 205j Little Goose Creek Wastewater Treatment Feasibility Study was completed by Sheridan County in 2009.

Monitoring by Wyoming DEQ (2009) on Soldier Creek spanning the years 1998 to 2003 showed that the aquatic life other than fish use is impaired from PK ditch downstream to the confluence with Goose Creek and supported from PK ditch upstream to the headwaters of the creek. Because the impairment is thought to be caused by flow alterations in the watershed, the segment was placed in category 4C in 2010 and a TMDL is not necessary.

Sheridan County Conservation District data collected in 2001 and 2002 showed exceedances of the temperature criteria for cold water fisheries in lower portions of the Goose Creek drainage and poor biotic condition close to Sheridan. Because the data were collected during near record low streamflows, definitive aquatic life other than fish and cold water fisheries use determinations could not be made. Sheridan County Conservation District and Wyoming DEQ monitoring indicated that storm water discharges are contributing excessive fine sediment to, and causing physical degradation of, Little Goose Creek (Wyoming DEQ 2012) from the confluence with Goose Creek upstream to Brundage Lane in Sheridan and Goose Creek (Wyoming DEQ 2012) within Sheridan. Aquatic life other than fish and cold water fisheries uses are not supported, and both of these reaches were added to the 303(d) list for this pollutant in 2006. TMDLs for 13 of the listed waters in the Goose Creek watershed were approved by EPA in 2010 and these waters were subsequently removed from the 303(d) list in 2012. These de-listed waters included 11 for fecal coliform on Park, Rapid, Big Goose, Beaver, Sackett, Jackson, Little Goose, McCormick, Kruse, Goose, and Soldier Creeks; and two for sediment on Little Goose and Goose Creeks.

Sheridan County Conservation District reports that Beaver Creek (a Class 3B water) has perennial streamflow, even during drought conditions, and suggested that it should be reclassified to Class 2AB (Wyoming DEQ 2012).

Wyoming DEQ (2002) monitoring on the Tongue River concluded that the cold water fishery use of lower Tongue River is impaired due to high temperatures. The USGS began continuously monitoring temperature on the stream, and showed that the cold water temperature criterion was exceeded every day for a 30-day period in 2001. Elevated temperatures were again observed by USGS during the 2002-2004 water years. Wyoming DEQ has conducted continuous temperature monitoring on the Tongue River at several sites. It has not been determined to what extent these high temperatures are due to anthropogenic influences, but the data suggest that the loss of riparian cover and an irrigation diversion may contribute. Because of these consistently high temperatures, the Tongue River below Goose Creek was added to the 303(d) list in 2002.

Assessments conducted by Sheridan County Conservation District (Wyoming DEQ 2012) indicate that the lower reach of the Little Tongue River from its mouth upstream to the confluence with Frisbee Ditch above the town of Dayton is not meeting its contact recreation uses, and it was added to the 303(d) list in 2002. Sheridan County Conservation District data also identified concerns with the effects of habitat degradation on the biological community in and near Dayton. Above Frisbee Ditch, the Little Tongue River is fully supporting its aquatic life other than fish and coldwater fisheries uses.

Bacteria samples collected by Sheridan County Conservation District on Smith Creek in Dayton, Columbus Creek near the Highway 14 crossing, Fivemile and Wolf Creeks near Ranchester, and the Tongue River between Monarch and Ranchester indicate that these streams are not supporting their contact recreational uses, and were added to the 303(d) list in 2002. Sheridan County Conservation District developed a watershed plan for the Tongue River watershed from Ranchester upstream to the Bighorn National Forest boundary and has received a Section 319 Grant to address the above issues. Implementation measures include animal feeding operations projects, riparian buffer development, stream bank stabilization, reservoir development, and grazing management changes.

Prairie Dog Creek, a tributary to the Tongue River, receives trans-basin diversion water, and this additional streamflow has contributed to habitat degradation in portions of the stream channel (Wyoming DEQ 2012). A riparian improvement project implemented by the WGFD and a landowner has rehabilitated portions of the instream and riparian habitats. Wyoming DEQ (2012) and Sheridan County Conservation District have conducted considerable monitoring in the Prairie Dog Creek watershed, and data indicate that most streams support their aquatic life other than fish uses, though isolated areas of poor habitat and high water temperatures in the lower watershed are concerns. E. coli counts in Prairie Dog Creek exceed the Wyoming DEQ criterion, indicating that it does not support its contact recreational use, so the stream was added to the 303(d) list in 2004. As part of a 2009 Sheridan County Watershed Improvement Project, Sheridan County Conservation District, NRCS, and local citizens used a Section 319 Grant to implement 31 projects designed to address bacterial impairments in the Tongue River, Goose and Prairie Dog Creek Watersheds; including 6 to replace septic systems, 3 stream bank stabilization projects, and 1 large scale river restoration project. Effectiveness monitoring for these projects was planned for 2009 through 2011. Prairie Dog Creek is also on the 303(d) list for exceedances of the secondary (aesthetic) human health criterion for manganese. Concentrations of manganese in the creek are far below the human health criteria, but can cause the discoloration of water and the staining of cooking utensils. It is likely that the high manganese concentrations are due to the natural geology of the basin (Rice et al. 2002), and a site specific criterion for the watershed is being considered. Sheridan County Conservation District completed the final report for the Prairie Dog Creek Watershed Assessment (2007-2008) in 2009. The report indicated that sedimentation may be affecting the macroinvertebrate community in Prairie Dog Creek and the impact of this pollutant is a concern. Data collected during this project resulted in seven additions to the 2012 303(d) list. The 2012 listings include: manganese and water temperature along lower Prairie Dog Creek, from Interstate 90 to a point 47.2 miles downstream; temperature from the confluence with the Tongue River to a point 6.7 miles upstream; manganese and primary contact recreation on Meade Creek, a tributary to Prairie Dog Creek, from the confluence with Prairie Dog Creek upstream to the confluence with an unnamed tributary; primary contact recreation on Dutch Creek from the confluence with Prairie Dog Creek to a point 1.9 miles upstream; and primary contact recreation on Wildcat Creek from the confluence with Prairie Dog Creek to a point 0.8 miles upstream. Sheridan County Conservation District completed a watershed-based plan for Prairie Dog Creek in 2011, which has been approved by Wyoming DEQ.

In 2004, the North Fork Tongue River was placed on the 303(d) list for non-support of its contact recreation use. In 2010, USFS data were used to modify the extent of the impairment from Road 171 upstream to the confluence with Pole Creek. A diverse stakeholder group, sponsored by the USFS, is working to manage this resource. Projects initiated by the stakeholder group include monitoring the watershed and using the resulting data to recommend, implement, and assess stocking rates and herding changes on the allotments within the watershed. These actions, along with federal land management and allotment planning is considered equivalent

to watershed planning, and therefore, the North Tongue River has been given a low priority for TMDL development.

USFS completed a channel stabilization project on the South Fork Tongue River in 2003 that helped to reduce sediment input to the South Tongue Watershed from the vicinity of the Dead Swede Campground. Wyoming DEQ (2008) monitoring conducted in 1993, 1995, 1998, and 2003 on the South Fork Tongue River indicated that it supports its aquatic life other than fish and cold water fisheries uses from Highway 14 upstream to the confluence with the East Fork South Fork Tongue River.

Wyoming DEQ monitoring of Prune Creek (Wyoming DEQ 2002), and Coney and West Fork of Big Goose Creeks (Wyoming DEQ 2002) indicates that these streams are supporting their aquatic life other than fish uses. USFS and Wyoming DEQ have removed improperly designed fish habitat structures within a livestock grazing exclosure on Bull Creek that were causing channel widening and excessive sediment deposition.

Groundwater

Two systems of differing groundwater chemistry are described within the PRB (Bartos and Ogle 2002; Rice et al. 2002). A shallow, chemically dynamic system, generally 200 to 500 feet deep, exhibits localized flow and consists of groundwater with a mixed composition of ions (charged particles in solution). Shallow groundwater contains calcium, magnesium, and lesser amounts of sodium as cations (positively charged ions) and bicarbonate or sulfate as the dominant anion (negatively charged ion). A deeper, underlying system that is chemically static exhibits regional flow and consists of groundwater with sodium and bicarbonate as the dominant ions (PRB Final EIS pg. 3-5).

The PRB Final EIS conducted extensive groundwater modeling efforts to determine existing conditions and enable forecasting for fluid mineral development. Volumes of water produced in association with CBNG were estimated by watershed based on Reasonable Foreseeable Development (RFD) predictions (PRB Final EIS Table 2-8 pg. 2-26). The WOGCC accumulates production figures for all wells in the state, including water production. Table W.2, "Coalbed Natural Gas Water Production" (p. 2642) presents comparison of actual water production (for all CBNG wells) by watershed to the predictions made in the PRB Final EIS. In general, actual production figures are much less than half of predictions, with the exception of the Middle Powder River and the Cheyenne River watersheds. In no cases have water production rate approached those anticipated, therefore impacts associated with water production should also not have achieved full force. For more information, regarding groundwater quality and quantity see the PRB Final EIS at pages 3-1 to 3-36 and the *Water Resources* section of Chapter 3.

Table W.2. Coalbed Natural Gas Water Production

Year	Predicted (Annual Acre-feet)	Predicted (Cumulative Acre-feet from 2002)	Actual (Annual Acre-feet)		Actual (Cumulative Acre-feet Beginning 2002)	
			Acre-feet	Percent of Predicted	Acre-feet	Percent of Predicted
Upper Tongue River						
2002	11,019	11,019	8,675	78.7	8,675	78.7
2003	16,950	27,969	8,574	50.6	17,248	61.7
2004	20,272	48,241	7,971	39.3	25,220	52.3
2005	22,133	70,374	9,397	42.5	34,617	49.2

Year	Predicted (Annual Acre-feet)	Predicted (Cumulative Acre-feet from 2002)	Actual (Annual Acre-feet)		Actual (Cumulative Acre-feet Beginning 2002)	
			Acre-feet	Percent of Predicted	Acre-feet	Percent of Predicted
2006	22,351	92,725	10,795	48.3	45,412	49.0
2007	19,945	112,670	11,984	60.1	57,396	50.9
2008	20,282	132,952	13,114	64.7	70,558	53.1
2009	15,782	148,734	10,523	66.7	81,081	54.5
2010	15,782	164,516	8,986	56.9	90,067	54.7
2011	15,654	180,170	7,739	49.4	97,806	54.3
2012	8,646	188,816	6,580	76.1	104,386	55.3
2013	4,721	193,537	-	-	-	-
2014	2,522	196,059	-	-	-	-
2015	1,290	197,349	-	-	-	-
2016	601	197,950	-	-	-	-
2017	214	198,164	-	-	-	-
Total	**198,164**		**104,386**			
Upper Powder River						
2002	100,512	100,512	15,846	15.8	15,846	15.8
2003	137,942	238,454	18,578	13.5	34,424	14.4
2004	159,034	397,488	20,991	13.2	55,414	13.9
2005	167,608	565,096	27,640	16.5	83,054	14.7
2006	171,423	736,519	40,930	23.9	123,984	16.8
2007	163,521	900,040	42,112	25.8	166,096	18.5
2008	147,481	1,047,521	45,936	31.1	212,522	20.3
2009	88,046	1,135,567	43,079	48.9	255,601	22.5
2010	60,319	1,195,886	43,263	71.7	298,864	25.0
2011	44,169	1,240,055	43,163	97.7	342,027	27.6
2012	23,697	1,263,752	31,755	134.0	373,782	29.6
2013	12,169	1,275,921	-	-	-	-
2014	5,672	1,281,593	-	-	-	-
2015	2,242	1,283,835	-	-	-	-
2016	1,032	1,284,867	-	-	-	-
2017	366	1,285,233	-	-	-	-
Total	**1,285,233**		**373,782**			
Middle Powder River						
2002	8,257	8,257	3,929	47.6	3,929	47.6
2003	10,421	18,678	3,860	37.0	7,789	41.7
2004	11,640	30,318	3,547	30.5	11,336	37.4
2005	12,328	42,646	4,588	37.2	15,924	37.3
2006	12,044	54,690	6,368	52.9	22,292	40.8
2007	9,897	64,587	7,020	70.9	29,312	45.4
2008	9,689	74,276	7,624	78.7	36,939	49.7
2009	6,030	80,306	6,253	103.7	43,192	53.8
2010	6,030	86,336	5,649	93.7	48,841	56.6
2011	5,899	92,235	4,764	81	53,605	58.1
2012	3,276	95,511	4,072	124.3	57,677	60.4
2013	1,797	97,308	-	-	-	-
2014	964	98,272	-	-	-	-
2015	495	98,767	-	-	-	-
2016	231	98,998	-	-	-	-
2017	82	99,080	-	-	-	-
Total	**99,080**		**57,677**			
Little Powder River						
2002	18,613	18,613	11,391	61.2	11,391	61.2

Year	Predicted (Annual Acre-feet)	Predicted (Cumulative Acre-feet from 2002)	Actual (Annual Acre-feet)		Actual (Cumulative Acre-feet Beginning 2002)	
			Acre-feet	Percent of Predicted	Acre-feet	Percent of Predicted
2003	20,822	39,435	8,767	42.1	20,158	51.1
2004	21,832	61,267	8,266	37.9	28,424	46.4
2005	22,427	83,694	8,529	38.0	36,953	44.2
2006	21,330	105,024	8,383	39.3	45,336	43.2
2007	18,607	123,631	7,566	40.7	52,902	42.8
2008	19,121	142,752	7,690	40.2	60,608	42.5
2009	8,016	150,768	4,266	53.2	64,874	43.0
2010	7,124	157,892	3,361	47.2	68,235	43.2
2011	6,439	164,331	1,558	24.2	69,793	42.5
2012	3,930	168,261	1,821	46.3	71,614	42.6
2013	2,340	170,601	-	-	-	-
2014	1,335	171,936	-	-	-	-
2015	699	172,635	-	-	-	-
2016	350	172,985	-	-	-	-
2017	133	173,118	-	-	-	-
Total	**173,118**		**71,614**			
Antelope Creek						
2002	15,460	15,460	2,668	17.3	2,668	17.3
2003	17,271	32,731	4,042	23.4	6,710	20.5
2004	17,685	50,416	5,181	29.3	11,891	23.6
2005	17,503	67,919	5,234	29.9	17,125	25.2
2006	17,385	85,304	5,869	33.8	22,994	27.0
2007	16,180	101,484	2,327	14.4	25,321	25.0
2008	12,613	114,097	1,983	15.7	27,304	23.9
2009	5,226	119,323	1,295	24.8	28,599	24.0
2010	3,574	122,897	1,097	30.7	29,696	24.2
2011	2,956	125,853	985	33.3	30,681	24.4
2012	1,041	126,894	769	73.9	31,450	24.8
2013	363	127,257	-	-	-	-
2014	124	127,381	-	-	-	-
2015	40	127,421	-	-	-	-
2016	13	127,434	-	-	-	-
2017	3	127,437	-	-	-	-
Total	**127,437**		**31,450**			
Upper Belle Fourche River						
2002	54,735	54,735	26,761	48.9	26,761	48.9
2003	67,481	122,216	24,309	36.0	51,070	41.8
2004	76,259	198,475	18,906	24.8	69,975	35.3
2005	82,713	281,188	12,817	15.5	82,792	29.4
2006	85,761	366,949	12,502	14.6	95,294	26.0
2007	84,507	451,456	8,677	10.3	103,971	23.0
2008	79,493	530,949	7,275	9.2	111,602	21.0
2009	49,435	580,384	4,541	9.2	116,142	20.0
2010	39,170	619,554	2,954	7.5	119,097	19.2
2011	31,277	650,831	2,073	6.6	121,170	18.6
2012	21,215	672,046	887	4.2	122,057	18.2
2013	13,495	685,541	-	-	-	-
2014	7,630	693,171	-	-	-	-
2015	3,347	696,518	-	-	-	-
2016	1,849	698,367	-	-	-	-
2017	790	699,157	-	-	-	-

Year	Predicted (Annual Acre-feet)	Predicted (Cumulative Acre-feet from 2002)	Actual (Annual Acre-feet)		Actual (Cumulative Acre-feet Beginning 2002)	
			Acre-feet	Percent of Predicted	Acre-feet	Percent of Predicted
Total	**699,157**		**121,170**			
Upper Cheyenne						
2002	7,978	7,978	7,118	89.2	7,118	89.2
2003	8,421	16,399	7,420	88.1	14,538	88.6
2004	8,365	24,764	7,926	94.7	22,463	90.7
2005	8,275	33,039	7,203	87.0	29,666	89.8
2006	8,228	41,267	7,291	88.6	36,957	89.6
2007	7,002	48,269	3,159	45.1	40,116	83.1
2008	5,897	54,166	2,760	46.8	43,207	79.8
2009	2,144	56,310	1,869	87.2	45,076	80.1
2010	1,456	57,766	1,475	101.3	46,551	80.6
2011	1,013	58,779	1,271	125.5	47,822	81.4
2012	357	59,136	1,169	327.5	48,991	82.8
2013	125	59,261	-	-	-	-
2014	43	59,304	-	-	-	-
2015	14	59,318	-	-	-	-
2016	4	59,322	-	-	-	-
2017	1	59,323	-	-	-	-
Total	**59,323**		**48,991**			
Crazy Woman Creek						
2002	9,449	9,449	4	0.0	4	0.0
2003	15,185	24,634	1	0.0	5	0.0
2004	18,418	43,052	126	0.7	130	0.3
2005	20,240	63,292	113	0.6	243	0.4
2006	21,135	84,427	392	1.9	635	0.8
2007	21,036	105,463	349	1.7	984	0.9
2008	20,279	125,742	560	2.8	1,573	1.3
2009	15,962	141,704	605	3.8	2,178	1.5
2010	13,716	155,420	1,113	8.1	3,291	2.1
2011	12,240	167,660	1,124	9.2	4,415	2.6
2012	6,731	174,391	649	9.6	5,064	2.9
2013	3,629	178,020	-	-	-	-
2014	1,881	179,901	-	-	-	-
2015	910	180,811	-	-	-	-
2016	422	181,233	-	-	-	-
2017	150	181,383	-	-	-	-
Total	**181,383**		**5,064**			
Clear Creek						
2002	10,697	10,697	875	8.2	875	8.2
2003	18,192	28,889	1,489	8.2	2,364	8.2
2004	22,415	51,304	1,434	6.4	3,798	7.4
2005	24,795	76,099	1,228	5.0	5,026	6.6
2006	26,267	102,366	752	2.9	5,778	5.6
2007	25,997	128,363	622	2.4	6,400	5.0
2008	24,879	153,242	2,081	8.4	8,486	5.5
2009	22,762	176,004	1,849	8.1	10,335	5.9
2010	22,071	198,075	1,504	6.8	11,839	6.0
2011	21,576	219,651	1,257	5.8	13,096	6.0
2012	11,969	231,620	1,270	10.6	14,366	6.2
2013	6,552	238,172	-	-	-	-
2014	3,500	241,672	-	-	-	-

Year	Predicted (Annual Acre-feet)	Predicted (Cumulative Acre-feet from 2002)	Actual (Annual Acre-feet)		Actual (Cumulative Acre-feet Beginning 2002)	
			Acre-feet	Percent of Predicted	Acre-feet	Percent of Predicted
2015	1,780	243,452	-	-	-	-
2016	832	244,284	-	-	-	-
2017	299	244,583	-	-	-	-
Total	**244,583**		**14,366**			
Source: WOGCC 2013						

Drilling and completion procedures for CBNG and conventional oil and gas wells are strictly controlled by WOGCC and BLM requirements which ensure each formation remains as isolated as it is under natural conditions and that the integrity of the wellbore remains intact. Development that occurs in accordance with these requirements is not likely to have allowed any leakage or mixing of groundwater in the formations that were penetrated due to recent development. However, many existing non-fluid mineral wellbores may not effectively isolate the formations penetrated and may serve as conduits for mixing of waters from different aquifers. Water wells frequently are screened over multiple aquifer zones, which would facilitate mixing of groundwater from different aquifer zones. Many older, conventional oil and gas wells likely are inadequately cased, which could have allowed any groundwater present to leak from one formation to another. Numerous uncased boreholes were drilled in the PRB to evaluate uranium potential and were not properly plugged, which could have allowed any groundwater present to leak through the formations penetrated. For additional information see Appendix V (p. 2599) as well as the Buffalo RMP RFD.

An additional groundwater use in the planning area is related to in situ recovery (ISR) uranium. There are several locations in the PRB where uranium is currently being solution mined (see the *Locatable Minerals* section in the Proposed RMP and Final EIS). Potential surface and groundwater issues could arise from the development of ISR uranium. However, ISR development is under the regulatory authority of the U.S. Nuclear Regulatory Commission (NRC), and water quality regulation and protection would be under the authority of Wyoming DEQ. In these active mining areas, the ambient groundwater is circulated as mining solution when oxidants are added for dissolving the uranium in the target formation. Mine areas are maintained in an under-balanced condition with respect to water quantity, which means that slightly more water is removed than the amount injected to prevent excursion of the solution from the targeted areas. The mined area is ringed with groundwater monitor wells in the target zone as well as above and below to monitor for leakage of the mine solution. Additionally, the mines are required to determine pre-mining baseline water quality which serves to set the goal for groundwater restoration after mining is complete. The Wyoming DEQ Land Quality Division (LQD) and WQD have authority over the restoration of the groundwater in a mined area, in concert with the requirements of the NRC. BLM's only nexus to the mining of uranium would be the management of BLM-administered surface within the mine boundary.

In areas where there is potential for conflict between oil and gas development of federal minerals and potential uranium extraction, the BLM requires that the operator's project includes design features to minimize impacts to the fluid mineral (oil and gas), as well as the locatable mineral (uranium).

W.1.3.2. Monitoring Programs

Federal and state government agencies, the oil and gas industry, local municipalities, and the mining industry have numerous programs for monitoring surface and groundwater quality, as well as quantity.

Surface Water

As noted above, the USGS is funded by numerous entities, including the BLM, to perform water quality and flow monitoring on selected mainstem locations within the planning area, such locations where some of the primary watersheds leave the planning area or state (Tongue River, Powder River, Little Powder River, Belle Fourche River, and Cheyenne River). Due to funding availability and decline of CBNG production, some of these locations may be discontinued or changed over time, based on results and related issues.

Every surface discharge is permitted through the Wyoming DEQ with conditions that the water quality be monitored at specific intervals with the results submitted to the state. These results provide information to guide the WYPDES permitting program. The BLM is obligated to insure compliance with all applicable state and federal laws and regulations, but in this case for water quality issues, the Wyoming DEQ is the enforcement agency.

Impaired Streams

The Wyoming DEQ is in the process of establishing TMDLs for pollutants for the impaired water bodies in the planning area. The BLM will continue to cooperate with the state in those efforts. As working groups are formed to address issues of impairment for specific reaches, the BLM will participate if, and when surface management authority dictates.

Groundwater

Beginning in the early 1990s with the onset of CBNG development, the BLM in concert with Wyoming State Engineer's Office (WSEO) and USGS, began a groundwater monitoring program to document the changes in water levels in the producing coal zones. The PRB Final EIS modeled the extent of drawdown in the Ft. Union coalbeds based on this historic production and groundwater levels. Since 1989, the monitoring program has been expanded to include most of the areas of current CBNG production (62 sites). The anticipated effects of CBNG production on groundwater were summarized as follows: "Because coal mining and CBM operations are dynamic, the maximum areal extent of drawdown may change over time and may increase in some areas of the PRB while it recovers in others. The maximum drawdown in any sub-watershed generally coincides with or closely follows the period of peak water production in the watershed." PRB Final EIS pg. 4-15.

Ongoing groundwater monitoring by the BLM has been documented and summarized by the Wyoming State Geological Survey in several updates available on their website at http://www.wsgs.uwyo.edu/public-info/onlinepubs/PRB-Drawdown.aspx. The updated data summary through 2012 will be available by the end of 2013. This summary validates the statement that the maximum area of drawdown will be the areas of peak water production. In the report, drawdown results are compared with aggregate CBNG production volumes (gas and water) within 1.5 miles of the monitoring well. In general, water levels have dropped where

CBNG water production has been highest. Gas pressures at the monitor wells have increased as gas production in the surrounding area increases and water production generally decreases.

The PRB Final EIS also predicted that there could be impacts to shallow groundwater sources due to infiltration at or near surface discharge points and containment impoundments, but made no predictions regarding changes to quality or quantity. In the early days of CBNG development, BLM began monitoring shallow groundwater at selected locations around the planning area. Results from this and other monitoring eventually led the Wyoming DEQ to apply additional requirements for testing through "Compliance Monitoring for Groundwater Protection Beneath Unlined Coalbed Methane Produced Water Impoundments" June 2004. Wyoming DEQ requires that prior to new impoundment construction, the proponent must determine the class of any groundwater located below the site of installation and estimate the volume of water by drilling an investigative well to at least 150 feet below ground surface or to bedrock, depending on the proposed size of impoundment. Depending on the designated class of use determined, the operator may be required to relocate the impoundment, monitor impacts to the groundwater or perform no additional monitoring (Wyoming DEQ 2006). Table W.3, "Summary of Wyoming DEQ WQD Coalbed Natural Gas Groundwater Database: 4th Quarter 2011" (p. 2648) below presents the data collected by the Wyoming DEQ regarding the shallow groundwater protection program as of the end of 2011.

Table W.3. Summary of Wyoming DEQ WQD Coalbed Natural Gas Groundwater Database: 4th Quarter 2011

Category	Number	Explanation
Operators	42	Unique company names
POD and/or Projects	285	Unique POD or Project names
Impoundments	2,017	Unique impoundment names
Wells or borings	2,306	Unique well and/or boring names and dry boreholes which were not given names
Permits (compliance monitoring authorization)	111	Chapter 3 as-built monitoring well permits (often includes multiple wells)
Permitted impoundments	249	Impoundments with permitted (CH_3) monitor wells and thus require ongoing compliance monitoring
Permitted: Class I Groundwater	2	As above over Class I Groundwater
Permitted: Class II Groundwater	1	As above over Class II Groundwater
Permitted: Class III Groundwater	234	As above over Class III Groundwater
Permitted: Class IV Groundwater	10	As above over Class IV Groundwater (likely a mix of Classes III and IV)
Compliance monitoring wells	307	-
Permitted impoundments in use (submitting monitoring data)	125	Impoundments with permitted (CH_3) monitor wells and confirmed in use by submitting data
Permitted impoundments not receiving discharge	91	Impoundments with permitted (CH_3) monitor wells and confirmed not in use (operator's word)
Permitted impoundments for which permits have been terminated	47	Permits terminated at operators request, not needed after all, did not receive discharge
Exempt impoundments total)	1,493	Impoundments which do not require further groundwater monitoring
Exempt: Class IV Groundwater	309	As above: exempt because groundwater is Class IV
Exempt: No groundwater encountered	1,091	As above: exempt because no groundwater was encountered

Category	Number	Explanation
Exempt: Small capacity	39	As above: exempt because capacity of reservoir is less than 2 acre-feet
Exempt: Other reasons (Class V, ET uptake, etc.)	54	As above: miscellaneous
Data submitted, groundwater authorization denied or not requested by operator	216	Impoundments for which a review or decision has not been made
Impoundments which have wells that have ever exceeded class of use limits for any parameter	26	-
Source: Wyoming DEQ 2012 CH_3 Methyl DEQ Department of Environmental Quality ET Evapotranspiration POD Plan of Development WQD Water Quality Division		

W.1.3.3. Reclamation Efforts

As stated previously, water produced in association with CBNG development is primarily discharged to impoundments. Through 2011, over 2,000 impoundments have been approved for water management associated with federal mineral development. All impoundments detaining waters of the state must be properly permitted through the WSEO. The WSEO began documenting impoundments permitted for CBNG development around 2003. As of 2011, over 3,100 CBNG-related impoundment permits were still active in the PRB. These impoundments contain over 36,000 acre-feet of water and disturb over 7,500 acres of surface area.

As CBNG production decreases and the volume of water containment/management facilities is also decreased, the operators are required to reclaim impoundments no longer needed for water management, as is required for all other federal actions that result in surface disturbance. In 2010, the Buffalo Field Office (BFO) issued a guidance document for the reclamation of impoundments which addresses some of the potential issues identified in the PRB Final EIS. The document "BFO Impoundment Reclamation Guidelines" can be accessed at: http://www.blm.gov/wy/st/en/field_offices/Buffalo/minerals.html. At reclamation, the operator is required to quantify the amount and chemical character of sediment deposited in the impoundment and propose disposition based on contaminants detected. As part of the reclamation process the location must be reclaimed to approximate the channel geometry that existed prior to disturbance to restore natural flow regimes. If the location is split estate, landowner notification is required.

At the time of abandonment, the BLM reviews requests from landowners or grazing lessees that desire to leave impoundments in place for range or grazing management. Additional reviews are also completed by the WSEO.

In 2005, the BFO began to require that operators proposing to construct impoundments or modify an existing structure submit a bond in the amount of the cost of reclamation for the facility. If for some reason the operator would default on their responsibilities to reclaim an impoundment, any bond monies held could be applied to the cost of reclamation of the site.

Currently, the WOGCC is in the process of adopting baseline groundwater monitoring requirements for all oil and gas development in the state. Operators will be required to sample for baseline water quality of any existing permitted functional water well within a 0.5 mile radius of the proposed well site. Additional sampling will be required at regular intervals following

development to determine if there were impacts to the water well resulting from the drilling and completion of the fluid mineral well. When this requirement is adopted by the state, the BLM will require compliance from any related federal action.

W.2. Water Resource Management Plan

W.2.1. Locatable Mineral Development and Coal Lease by Application

1. Mining plans for locatable minerals, including Bentonite and uranium are developed in cooperation with the Wyoming DEQ LQD. The NRC also has authority for the permitting of uranium development projects, in concert with the LQD. In all cases, the proponent would include a water management component in the POD or operation. Even locatable minerals projects not directly under BLM permitting authority can be reviewed by the BLM to ensure that no undue or unnecessary degradation would occur.
2. In the case of uranium mining, including ISR, the LQD and NRC are the permitting authorities, including the water management. Only in cases where there is BLM-administered surface included within the mine boundary would the BFO be responsible for conducting a NEPA review and approval of the project for the use of that surface. The BLM BFO has opportunity to comment on any and all mineral development projects as necessary.
3. The Wyoming DEQ and U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement have the permitting oversight and authority to mitigate water quality issues for a coal mining operation. The BLM does not stipulate any specific water quality permitting requirement for a coal lease, but requires lessees to comply with all applicable state and federal laws. A BLM EIS for a coal mining operation will analyze the potential effects to water quality, but any mitigation will be a requirement of the Wyoming DEQ through its permitting process.
4. The Wyoming DEQ WQD administers a WYPDES storm water permitting program to assist in managing the state's water resources. Under this program, anyone planning to construct, modify, or use a facility capable of emitting storm water and related effluents into waters of the state must obtain coverage under a Permit to Discharge Storm Water Under the WYPDES. Mineral and coal mining projects are required to prepare pollutant prevention plans as part of the permit application.
5. Water disposal through subsurface injection would require a permit from the Wyoming DEQ Underground Injection Control division of the WQD.
6. All permitted activities that include surface disturbance are required to address the eventual reclamation of that disturbance. (Management Action Water-1016 to achieve goals PR:3.1, PR:3.3, and PR:3.5) Authority for this is documented in 30 United States Code 226(g) which states: "The Secretary concerned shall, by rule or regulation, establish such standards as may be necessary to ensure that an adequate bond, surety, or other financial arrangement will be established prior to the commencement of surface-disturbing activities on any lease, to ensure the complete and timely reclamation of the lease tract, and the restoration of any lands or surface waters adversely affected by lease operations after the abandonment or cessation of oil and gas operations on the lease."
7. A new coal mine, or a modification to an existing mine, must be permitted by Wyoming DEQ LQD. A permittee must compile detailed water quality and quantity inventories and demonstrate compliance with all applicable aspects of Wyoming Water Quality Standards

and Regulations, including compliance with CWA, before either a permit or amendment is granted.

8. A Best Available Control Technology analysis is required to demonstrate the use of an appropriate level of air emissions controls, specifically for air quality issues in mining applications (Wyoming Air Quality Standards and Regulations Chapter 6, Section 2). Some of these control measures at mining operations would also be protective of water quality as well as air quality. Protective measures would include, but are not limited to: the paving of access roads to reduce erosion potential; the treating of major and temporary haul roads and work areas with a suitable dust suppressant which improves the erosion resistance of the surface; and the use of silos, trough barns, or similar enclosed containers for the storage of large volumes of material awaiting load out and shipment reducing the potential for impacts to surface waters.

W.2.2. Mineral and Energy Development Authorizations

1. The BLM manages the location, density, and/or rate of development on a site-specific basis to protect surface and water resources. 43 CFR 3101.1-2 allows that the BLM authorized officer may relocate a proposed action to a location within 200 meters (656 feet) of the original location to minimize adverse impacts to other resource values. This flexibility would enable the BLM to move any proposed action to a more suitable location, such as farther away from surface water, if there were potential environmental issues identified.
2. When reviewing a proposed project, the BLM will consider the magnitude of potential water impacts from the project, existing water quality conditions including impairments, proximity to riparian areas and other surface waters, and other issues identified during project scoping to identify pollutants of concern and to determine the appropriate level of water analysis to be conducted for the project.
3. Prior to approval, all projects submitted to BLM that involve construction, drilling or other surface disturbance will be assigned to an interdisciplinary team of specialist for site specific environmental analysis. The interdisciplinary team could consist of a Natural Resource Specialist, Wildlife Biologist, Archeologist, Civil Engineer, Realty Specialist, Geologist, Soil Scientist, Hydrologist, Legal Instruments Examiner, Petroleum Engineer, and Legal Assistant. All proposed disturbance is inspected (onsited) to identify site-specific resource protection concerns and requirements.
4. As required in the PRB Final EIS ROD, the proponent must submit a water management plan for proposed CBNG projects that are analyzed through an Environmental Assessment, Categorical Exclusion or Determination of NEPA Adequacy. The Water Management Plan requirements can be found in the ROD. The operator is required to estimate the quantity and quality of water produced in association with CBNG, describe the water management strategy selected (i.e., channel discharge, discharge to containment, re-injection, etc.), identify potential impacts from the management strategies and recommend or incorporate design features to address potential impacts. This information will inform monitoring (see the *Monitoring* section), and mitigation (see the *Mitigation* section).
5. The RFD for this RMP and Appendix G (p. 1937) projects that up to 10,000 additional CBNG wells may be drilled in the planning area from 2012 through 2028. Production from these wells is estimated at 2,473 billion cubic feet of gas and 318,754 acre-feet of water. The total volume of water estimated to be produced from development under the PRB Final EIS from 2002 through 2011 was 2,912,756 acre-feet. According to the data collected by the WOGCC, actual cumulative water production associated with CBNG through 2011 totaled 754,271 acre-feet or 26 percent of the total volume of water estimated to be produced. The additional

water production associated with newly constructed wells falls well within the volume estimated for CBNG development and thus should not exceed the impacts predicted. For more information, refer to the Proposed RMP and Final EIS Chapter 4, *Water Resources* section.

6. The quality of the water produced in association with CBNG predicted through 2028 is expected to be similar to that analyzed in the PRB Final EIS.
7. Water produced in association with CBNG will continue to be managed through surface discharge to containment impoundments, direct discharge to a receiving stream, storage and retrieval injection, injection in deep disposal wells, land application or discharge to evaporation ponds. The Wyoming DEQ has permitting authority for all the options with the exception of any injection associated with conventional oil and gas production. The Wyoming DEQ has revised the requirements for surface discharge and direct discharge to streams in specific watersheds to protect active irrigation downstream. The BLM reserves the right to deny any water management option that does not meet agency environmental standards.
8. The BLM will require a water management plan for proposed oil and gas development projects that are analyzed through an EIS.
9. For conventional oil and gas development, the operator must comply with Onshore Oil and Gas Order No. 7 by submitting a sundry notice to propose the water management for each well or groups of wells if it was not included in the design features of the original proposal.
10. Historically, the volume of water produced in association with oil starts very low and increases with time, dependent on reservoir characteristics. The RFD presents volumes of oil, gas and water produced through 2008 by formation in Table W.1, "Monthly Mean Discharge (cubic feet per second) 2001 to 2011" (p. 2627). For the average barrel of oil produced, 2.9 barrels of water have been produced considering all formations for a total of 451,791 acre-feet of water since the beginning of record keeping.
11. As described in Appendix V (p. 2599), conventional produced water is often used for secondary recovery or waterflooding through reinjection into the producing zone to increase oil recovery. However in the planning area, there are several locations where the water quality in various oil-bearing formations is such that it can be treated to meet WYPDES surface discharge water quality standards. The Wyoming DEQ has authority for permitting and monitoring surface discharge in the State of Wyoming.
12. The BLM has the responsibility to implement the decisions of the RMP in a manner that protects water quality. The BLM also must recognize valid and existing leasing rights. At the project approval stage, the BLM can require specific actions and measures to protect water quality based on expected impacts (Management Actions Water-1004, Water-1005, Water-1007, Water-1009, Water-1013, and Water-1014).
13. The proponent of an energy development project will be required to provide a detailed description of operator committed measures. These measures would include specific components to reduce project related potential water pollutant discharges, including petroleum product release and sediment movement due to surface erosion. Following, in the *Mitigation* section, is a list of potential mitigation measures. The list is not intended to preclude the use of other effective water pollution control technologies that may be proposed. Details of the mitigation measure would be submitted by the applicant and enforced as a condition of the BLM-issued authorization.
14. Prior to approval, all projects submitted to the BLM for review that are in close proximity to any identified impaired water body will be evaluated for their likelihood to contribute to the impairment and appropriate mitigation measures will be applied. The BLM will coordinate efforts with Wyoming DEQ in any programs they may have initiated to address the impairment.

15. In compliance with Executive Order 11190, BLM's initial recommendation for wetland and riparian areas is for the proponent to avoid the areas to the extent possible. However, if it is necessary to develop in those areas, mitigation will be required to be included in the design of the project. Alternatively, the BLM will apply any mitigation deemed necessary at the time of approval as a Condition of Approval.

W.2.3. Monitoring

1. As part of a comprehensive Water Management Plan for the planning area, the BLM will continue to work cooperatively with federal and state agencies responsible for managing water resources to determine, characterize, and track water resource conditions (Management Action Water-1006). BLM will cooperate with efforts of the Wyoming DEQ to evaluate monitored exceedances. Wyoming DEQ has authority and primacy for regulating and monitoring water quality within the state, including determining causes of monitored exceedances.
2. The BLM will support and participate in regional monitoring efforts to meet Management Actions Water-1004 and Water-1006.
3. The BLM will continue to perform Groundwater Monitoring to document changes to groundwater levels in the planning area due to fluid mineral or locatable mineral development to comply with Objective PR:3.6 through Management Action Water-1005. The Groundwater Monitoring program will also continue to document existing or potential migration between coal zones and adjacent sands.
4. A water quality exceedance would be the hard trigger requiring adaptive management to occur; Chapter 4 identifies NEPA significance criteria which would be additional hard triggers for adaptive management . Adaptive management can also be implemented prior to a water quality exceedance, such as when monitoring demonstrates a trend towards exceedance. BLM is committed to working cooperatively with the Wyoming DEQ, EPA, and other stakeholders to address water resource concerns.

W.2.4. Mitigation

The BLM reserves the right to modify the operations of surface-disturbing or disruptive activities as part of the statutory requirements for environmental protection. Those measures selected for implementation will be identified in the site-specific ROD or decision record for those activities and will inform a potential lessee, permittee, or operator of the requirements that must be met when using BLM-administered public lands and minerals.

1. Many of the activities that the BLM authorizes, permits, or allows include surface disturbance (vegetation removal or excavations) that have the potential to impact water quality. The primary mechanisms to reduce water quality impacts are to control and reduce erosion through strategies such as adjusting the rate of development, or by implementation of mitigations such as insuring interim reclamation success through use of surface stabilizing technologies.
2. The proponent of a project will be required to comply with all applicable state and federal regulations and may be required to apply additional mitigation and other technologies or strategies.
3. The BLM will ensure implementation of additional control measures and strategies within its regulatory authority and in consultation with federal and state agencies responsible for managing water resources, if:

a. Proposed or committed measures are insufficient to achieve water quality Goal PR:3 and objectives PR:3.1, PR:3.4, PR:1.3, and PR:3.7 and Management Actions Water-1004, Water-1005, and Water-1006; or
b. A BLM-authorized source caused or contributed to a monitored exceedance of the CWA as determined by Wyoming DEQ, in consultation with BLM.

Mitigation may include reduction in the number of locations, density, and/or rate of development, or other measures. BLM would apply mitigation as conditions of approval as a result of site-specific NEPA where design features of the project do not include adequate environmental protections.

Required Design Features

1. As required in the PRB Final EIS ROD, for CBNG development or for field development fluid mineral projects, the operator must include a water management plan for review with the APD or POD. The water management plan must provide adequate information for the BLM to complete site-specific NEPA analysis and to ensure compliance with all state and federal requirements prior to approval.
2. Operators need to certify that all potentially affected landowners (with water wells properly permitted by the WSEO) within each proposed oil or gas well's circle-of-influence were offered a Water Well Agreement. This agreement should commit the operator to replacing or repairing the water source if it is determined that the development has degraded or impaired the well. Example language for the Water Well Agreement is included in the PRB Final EIS ROD.
3. Proof of approved permit from the authorizing agency will be required prior to any surface water discharge or subsurface injection.
4. Lease Notice No. 1, which is attached to all leases, identifies that there are areas not specifically addressed by lease stipulations that may contain special values that require additional attention to prevent damage to surface and/or other resources. These areas include: slopes in excess of 25 percent; locations within 500 feet of surface water and/or riparian areas; locations within 0.25 mile of occupied dwellings.
5. Management action Water-1013 restricts surface disturbance within 500 feet of springs, reservoirs, water wells, and perennial streams. Similarly, management action Riparian-4009 restricts surface disturbance within 500 feet of riparian systems, wetlands, and aquatic habitats (144,045 acres). BLM has determined these management actions are sufficiently protective of most aquatic resources within the planning area as the primary water resource is ephemeral streams. In addition, there are several other management actions that provide benefit to aquatic resources such as (all listed acreage represent federal fluid mineral estate):
   - Soil-1004: surface disturbance is restricted in areas with a severe erosion hazard (669,739 acres);
   - Soil-1006 surface disturbance is restricted on slopes >25% (170,590 acres);
   - Soil-1010 surface disturbance is restricted in areas with limited reclamation potential (685,950 acres);
   - Fish-4013 surface disturbance is restricted within 0.25 mile of naturally occurring water bodies containing native or desirable non-native fish species (261,870 acres);
   - SS Fish-4008 no surface occupancy or use is allowed within 0.25 mile of any waters containing special status fish species (4,846 acres);
   - SS WL-4028 no surface occupancy or use is allowed within 0.5 mile of consistently used bald or golden eagle winter roosts and the following consistently used riparian corridors:

Clear Creek, Crazy Woman Creek, Piney Creek, Powder River, and Tongue River (58,902 acres);
- SS WL-4034 surface disturbance is restricted within 1,640 feet (500 meters) of perennial water, vernal pools, playas, and wetlands (1,217,959 acres).

This suite of management actions has been determined to be protective of the aquatic resources within the planning area. BLM reviews all project proposals and requires the appropriate mitigation to conserve water and other affected resources.

6. For CBNG development, the operator will be responsible for monitoring the natural springs which were identified within a 0.5 mile radius of the development. The springs will be sampled for a water analysis and the discharge rates will be determined at 6-month intervals for the duration of the associated CBNG development, or until the data trend indicates otherwise.
7. The operator is responsible for ensuring that the BLM has access to the area for monitoring and inspections in accordance with 43 CFR 3162.1(b) and 3164.3(b).

Recommended Design Features

1. Coordinate road construction and use among ROW and/or mineral lease holders to reduce the number of duplicate surface disturbance areas. Close and rehabilitate duplicate roads.
2. To reduce potential for surface and groundwater contamination, use only closed-loop systems for drilling operations, with no reserve pits.
3. In accordance with CWA Section 404, construct road crossing at right angles to ephemeral drainages and stream crossings.
4. Use directional and horizontal drilling to reduce surface disturbance and vegetation impacts (dust, erosion and sediment movement). Applicability depends on geologic strata.
5. Consider using oak (or other material) mats for drilling activities to reduce vegetation disturbance and for roads between closely spaced wells to reduce soil compaction and maintain soil structure to increase likelihood of vegetation reestablishment following drilling. This will reduce erosion potential.
6. Use mulch, soil amendments, and/or erosion control blankets to expedite reclamation and to protect soils.
7. The use of green (also known as closed-loop mud system) completions and green workovers, reduce or eliminate open pits and associated potential water contamination.
8. To reduce potential impacts to riparian areas or other sensitive wetlands or surface waters, locate disturbance activities 500 feet away from the water body, or further depending on site specific conditions.
9. To reduce potential impacts to surface water bodies impaired reaches or segments, locate 750 foot setback from reaches identified as being impaired due to surface flow contributions.
10. In order to provide protection for an aquifer that is currently being used for a domestic water supply, the operator should not attempt to locate an unlined produced water pit within 0.25 mile of a domestic use well.
11. In order to protect the surface waters of the state, produced water pits should be located 0.25 mile (1,320 feet) from the outermost alluvium (and adjacent mixtures) of any current stream system and, at a minimum, five hundred (500) feet from the edge of any bank-to-bank stream channel, pond, reservoir, wetland or lake.
12. General Guidance for Water Management Plan Development
    a. Consult private surface owner(s) early in the planning process and throughout the development of Water Management Plans.
    b. Develop Water Management Plans on a watershed basis, coordinating with other companies within the same watershed.

c. Consider all existing and anticipated upstream contributions (natural flow, runoff and other discharges) and determine through sound hydrologic analysis if the produced CBNG water from the wells, based on known or anticipated water production rates, will adversely impact downstream improvements, uses, and users (reservoirs, hay meadows, etc.).
d. Depending on the water quality and quantity, centralize the water discharge to localize the associated disturbance.
e. The BLM encourages innovative methods of using and managing produced CBNG water. Any proposed method will be evaluated and authorized on a case-by-case basis.
f. Locate discharge points and reservoirs in readily accessible areas for ease of installation and monitoring. Consider access options which involve the least surface disturbance in any erosion feature modification.

13. Discharge Points
    a. Locate discharge points in areas that will minimize erosion and impacts to the receiving channel, existing improvements, and downstream users.
    b. Locate discharge points in stable, low gradient drainage systems and below active headcuts when possible. If discharge is located above a headcut, mitigation measures will be required by the BLM authorized officer on a site-specific basis. Some mitigation measures will require engineering design.
    c. All discharge points will require energy dissipation measures.
    d. Discharge points may not be authorized by BLM regardless of WYPDES status or previous use and may be relocated or otherwise mitigated during onsite inspections where environmental issues exist.
    e. Cumulative produced water discharge must not exceed the naturally occurring 2-year peak flow of the receiving channel.
    f. Do not locate discharge points in playas or enclosed basins unless it can be demonstrated that it can be done without resulting in adverse impacts. Discharges into valley bottoms with no defined low-flow channel will generally not be allowed, but will be reviewed on a site-specific basis.
14. Channel Crossings
    a. Minimize channel disturbance as much as possible by limiting pipeline and road crossings.
        i. Avoid running pipelines and access roads within floodplains or parallel to a stream channel.
    b. Channel crossings by road and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow where possible, and all stream crossing structures will be designed to pass the 1-year discharge event without the buildup of static head and carry the 25-year discharge event or other capacities as directed by the BLM.
    c. Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.
    d. Low water crossings will be constructed at original streambed elevation in a manner that will prevent any blockage or restriction of the existing channel. Material removed will be stockpiled for use in reclamation of the crossings.
15. Water Control Structures

a. Reservoirs must be designed in accordance with WSEO standards. The reservoir should be designed to accommodate the proposed POD discharge volume as well as potential upstream development.
b. Locate off-channel pits so that negative impacts on the adjacent surface, surface water or groundwater are minimized.
c. On federal surface, if passage of water through a spillway is to be frequent, the spillway must be reinforced and designed for continual flow (regular flows on earthen spillways will not be allowed).

Mitigation Measures or Potential Conditions of Approval

1. The operator will be responsible for monitoring of the physical condition of the discharge point(s) on a monthly basis for the first year of operation. Inspectors will note the condition of each discharge point, check for evidence of erosion, and schedule any necessary maintenance work. (Note: the Wyoming DEQ is responsible for coordinating monitoring and compliance for the discharged water quality.)
2. Dam outlets (spillways and pipes) and culverts will be inspected quarterly and after major storm events for the first year of operation, for evidence of erosion, and schedule any necessary maintenance work.
3. Erosion stabilization measures and sediment control BMPs (head cut repairs, etc.) will be inspected on a monthly basis for the first year of operation and after major storm events. Inspectors will note condition and schedule any necessary maintenance work.
4. Channels within and below the project area will be inspected on a monthly basis and after major storm events for signs of accelerated erosion for the first year of operation.
5. The operator will inspect any wetland and/or riparian areas which are affected by the development for impacts resulting from the development.
6. Any mitigation work, repairs or other maintenance outside the scope of the initially authorized action will require approval by the BLM authorized officer prior to the initiation of any work. The proposed actions will be submitted as a Sundry Notice (Form 3160-5) to the BLM BFO.
7. After the first year of operation, inspections will occur annually unless specific sites have required mitigation action, then inspections will continue at the previous intervals until no action has been required for a full year.
8. If Land Application Disposal is a part of the Water Management Plan, monitoring of the soils and vegetation may be required on representative sites. Monitoring may include analysis of the water that is being applied and the affected soils.
9. The operator will monitor areas adjacent to discharge points and impoundments for vegetative changes, including the influx of noxious weeds and weeds of concern.
10. If the groundwater is designated as Class I by ambient quality, an unlined CBNG produced water pit may be allowed if it can be demonstrated that the water quality being discharged into the unlined CBNG produced water pit is of equal or better quality that the groundwater. If this condition cannot be met, the unlined CBNG produced water pit should not be located within that area, or an acceptable, alternative disposal method used. If the ambient quality of the groundwater is equal to or less than the quality of the CBNG produced water no restrictions would apply.

Best Management Practices

Environmental BMPs are state-of-the-art mitigation measures designed to provide for safe and efficient operations while minimizing undesirable impacts to the environment (BLM 2006f).

1. Eliminate the surface disposal of CBNG wastewater, as well as the construction of evaporation or infiltration reservoirs to hold wastewater. Inject CBNG wastewater underground into a formation of equal or lower water quality.
2. Place roads outside of riparian areas where possible.
3. Design and construct mineral exploration and development operations so as to disturb the smallest footprint practical on the landscape while meeting all safety requirements. Where feasible, consider mowing of parking and storage areas on portions of oil and gas well drilling locations rather than stripping the topsoil and vegetation from the entire location, and the use of two-track trails to conduct exploration activities.
4. Encourage the development of new technologies that would reduce total surface disturbance (i.e., directional drilling, multiple wells from the same well pad and reinjection of produced water).
5. The number of river, stream (including ephemeral streams), lake, and wetland crossings should be minimized, where possible. Bridges, culverts, and other drainage structures should be incorporated to ensure the free flow of water when drainage ways are intersected. Different flood stages should be considered for the design and construction of the crossings.
6. Injection and/or disposal wells should be completed so the injected fluids enter the desired formations and do not enter other formations or drinking water zones. Typical injections are completed with three levels of protection for drinking water formations:
    a. Surface casing and cement,
    b. Long string casing and cement, and
    c. Tubing and packer.
7. Also, the area around the injection should be reviewed to see of any wells (active, inactive or abandoned) were drilled through the injection and/or disposal zone. If wells were drilled close to the injection/disposal well that penetrated the injection and/or disposal formation and those wells did not isolate those zones, the injected fluids could flow from the injection zone through the improperly plugged or completed well to other oil and gas zones or drinking water zones.
8. For both new and existing wells, the known and anticipated needs for remedial cementing to protect underground sources of drinking water should be considered in the planning stage.
9. Natural drainage patterns of the area should be considered in the location of equipment, pads, and pits so that storm water runoff does not create an environmental hazard by erosion of base material, which could lead to equipment instability, or by flooding of pits, which could cause a discharge of oil or other fluids into the local surface waters.
10. Discharges of storm water from inside facilities such as bermed areas around tank batteries (including oil and gas exploration, production, processing, or treatment operations or a transmission facility), which can reach waters of the United States, require a storm water discharge permit and submittal of a storm water pollution plan to the Wyoming DEQ. Contamination includes storm water that comes into contact with any overburden, raw materials, or waste products on the site.
11. Construction designs should include installation of erosion and sedimentation control systems. Site construction should be inspected routinely and after each significant storm event. Any repairs to the control systems should be completed promptly. During the drilling and completion phases, all raw materials should be stored in a manner to prevent contaminating the natural runoff of precipitation. Temporary containment and liners should be used to minimize the impact of spills and to prevent impacted precipitation from affecting surface or groundwater.
12. Drip pans should be provided under equipment and storage containers potentially subject to minor leaks. These drip pans should be monitored on a routine basis to recover and recycle or dispose of accumulated oil and other liquids.

13. Bulk storage, recyclable, and reusable containers should be considered in order to reduce the number of containers that must be maintained and disposed. All reusable containers should be well marked to denote contents and the fact that they are to be reused.
14. For production equipment, the installation or use of double stuffing boxes, leak detectors, and shutdown devices should be considered in areas of particular environmental sensitivity.
15. Flare pits, sometimes called blowdown or emergency pits, cannot be used for storage or disposal. The primary purpose of a flare pit is to catch any incidental fluid that might be associated with the gas stream that does not burn. Fluids in a flare pit should be removed daily, or as quickly as practical.
16. Siting and construction of flare pits should minimize the risk of surface and groundwater contamination. The size of the flare pit should be proportionate to the volume of liquid effluent that might be expelled from the gas flare. Use of a knockout vessel should be considered.
17. It is essential that all formations bearing usable quality water, oil, gas, or geothermal resources be protected and/or isolated. The prevention of gas or fluid migration to other zones or to the surface is of primary importance. Open-hole plugs, casing plugs, or cement squeezed through casing perforations will isolate the target formations in most cases. However, special procedures, such as perforating casing and circulating cement, may be necessary to isolate that potential production or injection formations existing behind uncemented casing. It is important to prevent interzonal flow in an abandoned well so that such cross-flow does not interfere in the commercial exploitation of the zones through nearby wellbores.
18. Proximity to lakes, streams (including dry washes and ephemeral streams), wetlands, drainage and irrigation ditches, canals, flood plains, and shallow water wells should be evaluated in terms of disturbances during construction and routine operations, and in the event of accidental releases of production or completion fluids.
19. Depth to, and quality of, groundwater should be determined for the construction area. The potential impact to groundwater, particularly from any releases from buried lines should be considered.
20. Water handling facilities are typically located adjacent to, or within, production facilities. Initial planning for these facilities within a field should consider future development potential in order to minimize surface disturbance. When practical and economic, central field locations should be considered to avoid the use of multiple facilities. Facility sizing should consider future throughput increases to minimize the need for additional tankage and treating vessels.
21. Production and water handling facilities should be planned to utilize the smallest practical surface area consistent with safe, prudent, and economic operations. In addition, produced water may be saline and corrosive. Therefore, special care should be taken to minimize the possibility of environmental damage due to equipment upsets, spills, and leaks.
22. Baseline conditions and past land-use in the area should be documented. At a minimum, drinking water supplies should be identified and sampled before any development. Water usage should be determined during the planning phase so that water rights can be secured and disposal options evaluated and selected.
23. Whenever practical, tanks should be used instead of pits.
24. Pits should be designed and constructed to have 2 feet of freeboard, or provide adequate reserve capacity, to prevent overflow under maximum anticipated operating requirements and precipitation.
25. Installation of safety equipment and systems should be considered, i.e., emergency shutdown systems which have the ability to shut wells in, shut down compressors or other engines, or divert production during malfunctions or accidental releases. Where appropriate, alarm systems should be installed to notify the public or company officials of equipment failure or accidental releases.

26. Minimize and/or eliminate venting and/or use closed loop process where possible during "blow downs."
27. Reclaim and/or remediate existing open pits. Do not construct new open pits. This reduces potential for soil and water contamination.
28. Centralization (or consolidation) of water processing facilities (separation, disposal, injection, etc.) would reduce vehicle miles traveled (truck traffic) and associated erosion as well as surface disturbance.
29. Initiate an equipment leak detection and repair program, such as an enhanced direct inspection and maintenance program to reduce potential surface and groundwater contamination due to leakage.
30. Protect unpaved travel surfaces using treatments including watering, chemical suppressants, and gravel to reduce potential impacts to water and vegetation from runoff.

Appendix X. Federal Oil and Gas Operations on Split Estate Lands

Note: This appendix was added following the release of the Buffalo Draft Resource Management Plan and Environmental Impact Statement.

X.1. Purpose

The purpose of this appendix is to summarize the Bureau of Land Management's (BLM) procedures for considering proposals to conduct exploration and production operations on split estate federal oil and gas leases. This appendix is provided for information purposes only, and is not necessarily a complete statement of rights, obligations, or processes. This appendix is not a part of the BLM's land use plan decision for the Resource Management Plan (RMP). Any conflict with any statute or regulation is unintentional. In the event of a conflict, the statute or regulation controls. Federal oil and gas lessees and operators, and private surface owners, are advised to confer with the BLM at the time an action is proposed for BLM's consideration, in order to obtain information about the current regulations and policies that may apply to the proposal. Nothing in this appendix affects the authority of any Tribe or of the Bureau of Indian Affairs in any way. This RMP applies to federal lands as defined by the Federal Land Policy and Management Act (FLPMA), and does not apply to lands held in trust for any Tribe or for any individual Indian or Indians.

X.2. Definitions

Casual use (operations): "Casual use means activities involving practices that do not ordinarily lead to any appreciable disturbance or damage to lands, resources, or improvements. This term does not apply to private surface. Casual use includes surveying activities" (Onshore Oil and Gas Order No. 1, part II).

Lease: "means any contract, profitshare arrangement, joint venture or other agreement issued or approved by the United States under a mineral leasing law that authorizes exploration for, extraction of or removal of oil or gas" (Onshore Oil and Gas Order No. 1, part II).

Lease facility or *production facility*: "Production facilities means a lessee's or lease operator's pipes and equipment used on the leasehold to aid in extracting, processing, and storing oil and gas…" (64 Federal Register [FR] 32140). See also BLM Manual Section 2880 ("Mineral Leasing Act Rights-of-Way") at Page 9.

Lease site: "means any lands, including the surface of a severed mineral estate, on which exploration for, or extraction and removal of, oil or gas is authorized under a lease" (43 Code of Federal Regulations [CFR] 3160.0-5).

Lessee: "means any person holding record title or owning operating rights in a lease issued or approved by the United States" (43 CFR 3160.0-5).

Operator: "means any person or entity including but not limited to the lessee or operating rights owner, who has stated in writing to the authorized officer that it is responsible under the terms

and conditions of the lease for the operations conducted on the leased lands or a portion thereof" (43 CFR 3160.0-5).

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…" (Federal Land Policy Management Act of 1976, Sec. 103(e)).

Private surface owner: "Private Surface Owner means a non- Federal or non-state owner of the surface estate and includes any Indian owner of surface estate not held in trust by the United States" (Onshore Oil and Gas Order No. 1, part II).

Split estate: "Split Estate means lands where the surface is owned by an entity or person other than the owner of the Federal or Indian oil and gas" (Onshore Oil and Gas Order No. 1, part II). "When tribal lands are held in trust or are subject to Federal restrictions against alienation the Bureau of Indian Affairs is the Surface Managing Agency, but if lands are held in unrestricted fee, those lands are treated the same as private surface" (Preamble to Onshore Oil and Gas Order No. 1 revisions, 72 FR 10322-10323, March 7, 2007).

Surface Managing Agency: "Surface Managing Agency means any Federal or state agency having jurisdiction over the surface overlying Federal or Indian oil and gas" (Onshore Oil and Gas Order No. 1, part II).

X.3. General

In considering and authorizing exploration and development of split estate federal oil and gas leases, the BLM prefers that the operator and split estate surface owner reach a Surface Access Agreement for proposed oil and gas operations. The BLM coordinates with both the operator and surface owner, in accordance with the requirements of Onshore Oil and Gas Order No. 1, and generally provides the surface owner's lands the same level of resource (soil, water, vegetation, air, visual, cultural, etc.) protection as would be required on BLM-administered public lands.

"The BLM will offer the surface owner the same level of surface protection that the BLM provides on Federal surface. The BLM will not apply standards or conditions that exceed those that would normally be applied to Federal surface, even when requested by the surface owner" (The Gold Book, page 12).

Federal mineral lessees may enter onto a privately-owned surface to the extent necessary to explore and produce the federal minerals in compliance with the relevant statutes and BLM regulations and land use designations. The BLM does not have the authority to regulate a surface owner's use of the surface estate, but does have the authority to regulate the activities of federal mineral lessees and mining claimants. The BLM adds lease stipulations to split estate federal oil and gas leases, in order to ensure that leasing decisions conform to the approved RMP for the area.

X.4. Operations

X.4.1 Geophysical

The BLM's authority to permit geophysical operations is described under 43 CFR §3150.0-1:

> *Geophysical exploration on public lands, the surface of which is administered by the Bureau, requires Bureau approval. The procedures in this part also apply to geophysical exploration conducted under the rights granted by any Federal oil and gas lease unless the surface is administered by the U.S. Forest Service. However, a lessee may elect to conduct exploration operations outside the rights granted by the lease, in which case authorization from the surface managing agency or surface owner may be required… The procedures of this part do not apply to… operations conducted on private surface overlying public lands unless such operations are conducted by a lessee under the rights granted by the Federal oil and gas lease…*

As BLM Handbook H-3150-1[1] at pages 1–2 explains:

> *In those situations where Federal minerals are underlying private surface and the private surface owner's consent is obtained, the BLM is not to become involved. However, when landowner consent for access to the surface cannot be obtained for geophysical exploration operations on a Federal lease by the lease operator, the geophysical operation is to be authorized using the Sundry Notice process…*[2]

> *When the geophysical exploration operator is the Federal lessee or designated operator of the lessee, it is to file a Sundry Notice… with the BLM and provide notification to the surface owner by certified mail that it intends to enter onto the lands and conduct lease operations. The lessee/operator must then submit proof to the BLM authorized officer that the surface owner has been notified. The lessee or operator must also submit proof to the BLM authorized officer that it has a current and adequate bond payable to the United States for use by the surface owner for damages caused during exploration operations. The authorized officer must give the surface owner 30 days to comment on the proposed action before approving the Sundry Notice.*

When a surface access agreement is reached to conduct geophysical operations on split estate lands with leased or unleased federal oil and gas, the BLM does not become involved.

The BLM will not accept a NOI to Conduct Geophysical Operations (NOI), BLM Form 3150-4 or bond to permit entry to split estate lands with unleased federal oil and gas, since the BLM has not issued an oil and gas lease to allow for operations under 43 CFR Part 3160 (see 43 CFR 3150.0-1).

In order to conduct geophysical operations on split estate lands where a federal oil and gas lease has been issued and where an agreement with the surface owner has not been reached, the lessee or the operator must first obtain BLM authorization through an NOI that proposes entry to those lands in order to conduct geophysical operations. The lessee or designated operator must provide to the BLM a certification (see Attachment 1) that a good-faith effort was made to: (a) notify the landowner prior to entry; (b) obtain a Surface Access Agreement; and (c) deliver a copy of the proposed NOI to the surface owner.[3] The NOI must also identify the surface owner and include the owner's name, address, and telephone number, if known. A good and sufficient bond to secure

[1]Onshore Oil and Gas Geophysical Exploration Surface Management Requirements. January 9, 2007.
[2]In BLM Washington Office Instruction Memorandum (IM) 2009-121, "Approval of Notice of Intent (NOI)to Conduct Geophysical Exploration to Federal Oil and Gas Lessee on Split Estate", dated May 8, 2009, the BLM recognized that the Sundry Notice form (BLM Form 3160-5) is an imperfect form to use for permitting of geophysical operations. This policy clarified that the BLM will "no longer require the lessee or its operator to file a Sundry Notice" for the purpose of proposing entry to federal leases where a surface owner denies access to the lessee or its operator. In its place the BLM would use the NOI form (BLM Form 3150-4).
[3]See Onshore Oil and Gas Order No. 1, Part VI.

payment of applicable damages for the use and benefit of the surface owner must be provided to the BLM on BLM Form 3160-19. The lessee or designated operator must also submit to the BLM evidence of service of a copy of the bond upon the surface owner. Prior to authorizing the NOI proposing entry to the lands for which the bond has been submitted, the BLM notifies the surface owner and provides a 30-day period during which the surface owner may protest the sufficiency of the bond. If the sufficiency of the bond is protested, the BLM reviews the bond amount and determines if it is adequate. That decision by the BLM is subject to State Director Review upon a request by any adversely affected party and the State Director's decision is subject to appeal to the Interior Board of Land Appeals.[4]

X.4.2 Notice of Staking/Application for Permit to Drill

X.4.2.1 Surveying and Staking Activities

The lessee or operator is encouraged to contact the surface owner of split estate lands early in the process of planning for exploration and development of a federal lease. This facilitates early discussion about the goals and objectives of both the surface owner and operator. Communication between the lessee or operator and surface owner can reduce potential conflicts, thereby reducing misunderstandings and permit processing times.

For surveying and staking activities, "[t]he operator is responsible for making access arrangements with the appropriate Surface Managing Agency (other than the BLM and the FS) or private surface owner" (Onshore Oil and Gas Order No. 1, part III.D.2.a).

"No entry on split estate lands for surveying and staking should occur without the operator first making a good faith effort to notify the surface owner. Also, operators are encouraged to notify the BLM or the FS, as appropriate, before entering private lands to stake for Federal mineral estate locations" (Onshore Oil and Gas Order No. 1, part III.D.2.b).

Aside from surveying and staking the proposed well location, road, pipeline, and/or other lease facilities, the operator may also be required to conduct resource condition surveys of the leased lands.

"As provided in the oil and gas lease, the BLM may request that the applicant conduct surveys or otherwise provide information needed for the BLM's National Historic Preservation Act consultation with the State Historic Preservation Officer or Indian tribe or its Endangered Species Act consultation with the relevant fisheries agency. The Federal mineral lessee has the right to enter the property for this purpose, since it is a necessary prerequisite to development of the dominant mineral estate. Nevertheless, the lessee or operator should seek to reach agreement with the surface owner about the time and method by which any survey would be conducted" (Onshore Oil and Gas Order No. 1, part VI).

X.4.2.2 Onsite Inspection(s)

On split estate lands, the onsite inspection provides the opportunity for the BLM, operator, and surface owner to evaluate and discuss the proposed well location or lease facility in the field.

"Within 10 days of receiving the application, the BLM, in coordination with the operator and Surface Managing Agency, including the private surface owner in the case of split estate minerals,

[4]See 43 CFR §3165.3(b). *See, e.g., William P. Maycock*, 176 Interior Board of Land Appeals 206 (2008).

will schedule a date for the onsite inspection (unless the onsite inspection has already been conducted as part of a Notice of Staking)" (Onshore Oil and Gas Order No. 1, part III.E.2.a).

"On non-NFS lands, the BLM will invite the Surface Managing Agency and private surface owner, if applicable, to participate in the onsite inspection. If the surface is privately owned, the operator must furnish to the BLM the name, address, and telephone number of the surface owner if known" (Onshore Oil and Gas Order No. 1, part III.C).

At the onsite inspection, the BLM will consider applicable Best Management Practices (BMPs) that would avoid or mitigate environmental impacts to natural resources. The onsite inspection provides the surface owner with the opportunity to review the proposed well location and/or lease facilities; provide information to the BLM and operator about resources, improvements, and land uses; and express preferences for BMPs to be used for lease operations.

"All parties who attend the onsite inspection will jointly develop a list of resource concerns that the operator must address in the APD. The operator will be provided a list of these concerns either during the onsite inspection or within 7 days of the onsite inspection. Surface owner concerns will be considered to the extent practical within the law" (Onshore Oil and Gas Order No. 1, part III.C).

"The BLM will invite the surface owner to the onsite inspection to assure that their concerns are considered" (Onshore Oil and Gas Order No. 1, part VI).

X.4.2.3 Required Components of a Complete APD for Split Estate Operations

X.4.2.3.1 Description of Surface Ownership

A description of the surface ownership (with name, address, and telephone number, if known) along with a certification must be included in the APD submitted by the operator to the BLM.

"The operator must indicate (in a narrative) the surface ownership at the well location, and of all lands crossed by roads that the operator plans to construct or upgrade, including, if known, the name of the agency or owner, phone number, and address. The operator must certify that they have provided a copy of the Surface Use Plan of Operations required in this section to the private surface owner of the well site location, if applicable, or that they made a good faith effort if unable to provide the document to the surface owner" (Onshore Oil and Gas Order No. 1, part III.D.4.k).

X.4.2.3.2 Surface Access Agreement or Waiver

For operations on leased split estate lands, the operator must undertake a good faith effort to reach a Surface Access Agreement.

"[I]n the case of actual oil and gas operations, the operator must make a good faith effort to notify the private surface owner before entry and make a good faith effort to obtain a Surface Access Agreement from the surface owner… The Surface Access Agreement may include terms or conditions of use, be a waiver, or an agreement for compensation. The operator must certify to the BLM that: (1) It made a good faith effort to notify the surface owner before entry; and (2) That an agreement with the surface owner has been reached or that a good faith effort to reach an agreement failed" (Onshore Oil and Gas Order No. 1, part VI).

"The operator must make a good faith effort to provide a copy of their Surface Use Plan of Operations to the surface owner" (Onshore Oil and Gas Order No. 1, part VI). The operator must also provide a copy of any revisions to the Surface Use Plan of Operations to the surface owner. If required under Onshore Oil and Gas Order No. 6 ("Hydrogen Sulfide Operations"), the BLM requires the operator to provide a copy of the Public Protection Plan to the surface owner.

"The surface use agreement between the surface owner and the operator is confidential. However, the APD Surface Use Plan of Operations must contain sufficient detail about any aspects of the agreement necessary for NEPA documentation and to determine that the operations will be in compliance with laws, regulations, Onshore Orders, and agency policies" (The Gold Book, page 12).

"If the BLM's requirements conflict with provisions in the Surface [Access] Agreement, the operator or surface owner should disclose that conflict at the onsite or to the BLM in writing, and the BLM should consider those conflicts in making its final decision" (BLM's Split Estate Report to Congress at page 15). Thus, to the extent terms of the agreement may conflict with Conditions of Approval, or Conditions of Approval, to the APD, the BLM should be made aware of those terms, so that they can be considered in the BLM's final decision.

"The BLM does not review the Surface Use Agreement and does not enforce portions of the Surface Use Agreement that are not contained within the approved APD" (BLM's Split Estate Report to Congress at page 17).

X.4.2.3.3 Bonding In Lieu of a Surface Access Agreement or Waiver

It is the preference of the BLM that the operator and surface owner reach a Surface Access Agreement. However, in those cases where an agreement is not reached, the BLM follows the procedural requirements in the BLM's regulations and policies. A good and sufficient bond to secure payment of applicable damages for the use and benefit of the surface owner must be provided to the BLM on BLM Form 3160-19. The lessee or designated operator must also submit to the BLM evidence of service of a copy of the bond upon the surface owner. Prior to authorizing the APD proposing entry to the lands for which the bond has been submitted, the BLM notifies the surface owner and provides a 30-day period during which the surface owner may protest the sufficiency of the bond. If the sufficiency of the bond is protested, the BLM reviews the bond amount and determine if it is adequate. That decision by the BLM is subject to State Director Review upon a request by any adversely affected party and the State Director's decision is subject to appeal to the Interior Board of Land Appeals.[5]

"If no agreement was reached with the surface owner, the operator must submit an adequate bond (minimum of $1,000) to the BLM for the benefit of the surface owner sufficient to: (1) Pay for loss or damages; or (2) As otherwise required by the specific statutory authority under which the surface was patented and the terms of the lease. Surface owners have the right to appeal the sufficiency of the bond. Before the approval of the APD, the BLM will make a good faith effort to contact the surface owner to assure that they understand their rights to appeal" (Onshore Oil and Gas Order No. 1, part VI).

"The bond amount will be reviewed by the BLM to assure that it is sufficient based on the appropriate law" (Preamble to Onshore Oil and Gas Order No. 1 revisions, 72 FR 10323, March 7, 2007).

If operations under an approved APD result in loss or damages that are compensable under the statutes by which the lands were patented, the surface owner may obtain judgment from a court of competent jurisdiction. The BLM will then release from the bond the amount ordered by the court to the surface owner.

[5]See 43 CFR §3165.3(b). *See, e.g., William P. Maycock,* 176 Interior Board of Land Appeals 206 (2008).

X.4.2.4 Approval of the APD

The BLM considers the views of the surface owner before approving the APD. The BLM must prepare an environmental record of review (43 CFR 3162.5-1(a)) to document its evaluation of potential resource impacts, including documentation of NEPA compliance.

"The BLM must comply with NEPA, the National Historic Preservation Act, the Endangered Species Act, and related Federal statutes when authorizing lease operations on split estate lands where the surface is not Federally owned and the oil and gas is Federal. For split estate lands within U.S. Forest Service (USFS) administrative boundaries, the BLM has the lead responsibility, unless there is a local BLM/USFS agreement that gives the USFS this responsibility" (Onshore Oil and Gas Order No. 1, part VI).

"After the APD is approved the operator must make a good faith effort to provide a copy of the Conditions of Approval to the surface owner. The APD approval is not contingent upon delivery of a copy of the Conditions of Approval to the surface owner" (Onshore Oil and Gas Order No. 1, part VI).

X.4.3 Sundry Notices

Operations proposed by Sundry Notice that will result in additional surface disturbance or re-disturbance of previously reclaimed areas require a Surface Use Plan of Operations.

"Prior to commencing any operation on the leasehold which will result in additional surface disturbance, other than those authorized under § 3162.3–1 or § 3162.3–2 of this title, the operator shall submit a proposal on Form 3160–5 to the authorized officer for approval. The proposal shall include a surface use plan of operations" (43 CFR 3162.3-3).

"The operator must certify on Form 3160–5 that they have made a good faith effort to provide a copy of any proposal involving new surface disturbance to the private surface owner in the case of split estate" (Onshore Oil and Gas Order No. 1, part VIII.A).

For review of Final Abandonment Notices (FANs) submitted by an operator on split estate lands, the BLM will consider the views of the surface owner.

"If applicable, the private surface owner will be notified and their views will be carefully considered" (Onshore Oil and Gas Order No. 1, part XII).

"In cases where the Surface Managing Agency or private surface owner desires to acquire an oil and gas well and convert it to a water supply well or acquire a water supply well that was drilled by the operator to support lease operations, the Surface Managing Agency or private surface owner must inform the appropriate BLM office of its intent before the approval of the APD in the case of a dry hole and no later than the time a NOI to Abandon is submitted for a depleted production well… The Surface Managing Agency or private surface owner must reach agreement with the operator as to the satisfactory completion of reclamation operations before the BLM will approve any abandonment or reclamation. The BLM approval of the partial abandonment under this section, completion of any required reclamation operations, and the signed release agreement will relieve the operator of further obligation for the well. If the Surface Managing Agency or private surface owner acquires the well for water use purposes, the party acquiring the well assumes liability for the well" (Onshore Oil and Gas Order No. 1, part IX.B).

"Completion of a well as plugged and abandoned may also include conditioning the well as water supply source for lease operations or for use by the surface owner or appropriate Government Agency, when authorized by the authorized officer. All costs over and above the normal plugging and abandonment expense will be paid by the party accepting the water well" (43 CFR 3162.3-4(b)).

X.4.4 Emergency Operations

"In the event of an emergency, the operator may take immediate action without prior Surface Managing Agency approval to safeguard life or to prevent significant environmental degradation. The BLM or the USFS must receive notification of the emergency situation and the remedial action taken by the operator as soon as possible, but not later than 24 hours after the emergency occurred. If the emergency only affected drilling operations and had no surface impacts, only the BLM must be notified. If the emergency involved surface resources on other Surface Managing Agency lands, the operator should also notify the Surface Managing Agency and private surface owner within 24 hours" (Onshore Oil and Gas Order No. 1, part IV.d).

X.5. References

- Onshore Oil and Gas Order No. 1
- Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development ("The Gold Book")
- 43 CFR Part 3150
- 43 CFR Part 3160
- 43 CFR Subpart 3814
- BLM Wyoming – Wyoming Oil and Gas Conservation Commission Memorandum of Understanding
- BLM Handbook H-3150-1 (Geophysical Handbook)
- BLM Form 3160-019 ("Bond For Surface Owner Protection")
- BLM Brochure: Split Estate – Rights, Responsibilities, and Opportunities
- BLM Brochure: Split Estate – Cultural Resource Requirements on Private Surface – Federal Minerals for Oil and Gas Development
- BLM-Washington Office Instruction Memorandum 2003-131 ("Permitting Oil and Gas on Split Estate Lands and Guidance for Onshore Oil and Gas Order No. 1"), April 2, 2003.
- BLM-Washington Office Instruction Memorandum 2007-165 ("Split Estate Report to Congress – Implementation of Fluid Mineral Leasing and Land Use Planning Recommendations"), July 26, 2007.
- Energy Policy Act of 2005, Section. 1835 ("Split-Estate Federal Oil and Gas Leasing and Development Practices").

- Energy Policy Act of 2005 – Section 1835 – A Report to Congress (December 2006).
- BLM-Washington Office Instruction Memorandum 1989-201 ("Legal Responsibilities of BLM for Oil and Gas Leasing and Operations on Split Estate Lands"), January 4, 1989.

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Appendix Y. Comment Analysis

Note: This appendix was added following the release of the Buffalo Draft Resource Management Plan and Environmental Impact Statement.

Y.1. Introduction

On June 28, 2013, the Bureau of Land Management (BLM) published the Notice of Availability (NOA) in the Federal Register announcing the release of the Draft Resource Management Plan (RMP) and Environmental Impact Statement (EIS) for the Buffalo Field Office planning area. The NOA initiated the 90-day public comment period. The public comment period ended on September 26, 2013. During the public comment period, the BLM hosted four public meetings in August 2013, in towns and cities throughout the planning area. At the public meetings, the BLM gave a formal presentation on the RMP revision, encouraged meeting attendees to comment on the Draft RMP and EIS, and Interdisciplinary Team members were available to answer questions from the public.

During the public comment period, the BLM received 134 unique comment documents and 2,143 form letters. This report summarizes the full range of issues and concerns as submitted by the public during the comment period. The submitted comments and summaries presented in this report do not necessarily represent the sentiments of the public as a whole. However, this summary does attempt to provide fair representation of the wide range of views submitted during the public comment period. Comment analysis is a process that allows the BLM to review and consider received comments, develop appropriate responses, revise the Draft RMP and EIS in response to comments, and support the BLM's decision-making process.

The remainder of this report is organized as follows:

- **Comment Analysis Process** – Describes how the BLM received, recorded, and categorized comment documents and comments.
- **Commenter Demographics** – Presents demographic information associated with submitted comment documents, including geography and affiliation of commenters.
- **Analysis of Comments** – Provides a breakdown of the number of comments received by issue category, a summary of comments received, and a summary of the BLM's response to comments received.
- **Attachment A: Commenter Index** – Includes instructions on how to use the tables in Attachment A and Attachment B. It also includes an index listing the names of all commenters and their associated comment document number. Attachment A is provided on the Buffalo RMP website: http://www.blm.gov/wy/st/en/programs/Planning/rmps/buffalo.html.
- **Attachment B: Individual Comments and Issue Categories** – Includes all substantive public comments received during the public comment period along with issue categories to help users find the associated comment and response summaries. Attachment B is provided on the Buffalo RMP website: http://www.blm.gov/wy/st/en/programs/Planning/rmps/buffalo.html.

Y.2. Comment Analysis Process

The BLM used a systematic process to compile, categorize, and evaluate written comments from individuals, federal and state agencies, Tribal governments, elected representatives, and other organizations on the Draft RMP and EIS to identify substantive issues for review and response by

BLM decision-makers. The comment analysis process provides a methodical approach for the BLM to revise text in the Draft RMP and EIS based on comments provided during the public comment period. Additionally, through the comment analysis process, the BLM supplemented the project mailing list, and compiled demographic information on the geographic distribution of commenters.

Public comment documents include hardcopy comments received at the public meetings, and electronic or written comment documents postmarked within the 90-day public comment period. Methods of comment document submittal included U.S. mail, email, and electronic submission through ePlanning. All individuals attending public meetings were encouraged to submit comments in writing. The entire written submission from a commenter (e.g., full letter or email) is referred to as a "public comment document;" an individual and identifiable substantive expression of interest or issue statement included in a public comment document is referred to as a "comment." For example, a letter (i.e., public comment document) received within the public comment period might have included one or more separate comments. "Commenter" refers to the individual or organization who submitted the comment document.

Y.2.1. Analysis Process

The BLM comment analysis team used the software program CommentWorks®, an online comment tracking and analysis platform, to catalogue, number, review, categorize, and respond to public comments on the Draft RMP and EIS.

Upon receipt of a public comment document, a member of the comment analysis team logged the comment document into a comment tracking spreadsheet, assigned the document a unique identifier (e.g., Document 1001), and converted the comment document to a searchable electronic (i.e., PDF) document. The analysis team then added all pertinent commenter information (e.g., name, affiliation, address, and type of comment document) into CommentWorks® and uploaded the electronic documents to the system.

The first step in the analysis process was to identify individual substantive comments within a public comment document. The comment analysis team identified each substantive comment based on guidance in the BLM National Environmental Policy Act (NEPA) Handbook (H-1790-1). Substantive comments are those that do one or more of the following:

- Question, with reasonable basis, the accuracy of information in the RMP and EIS
- Question, with reasonable basis, the adequacy of, methodology for, or assumptions used for the environmental analysis
- Present new information relevant to the analysis
- Present reasonable alternatives other than those analyzed in the RMP and EIS
- Cause changes or revisions in one or more of the alternatives

Comments not considered substantive included the following:

- Comments in favor of or against the Proposed Action or alternatives without reasoning that meet the substantive comment criteria listed above
- Comments that only agree or disagree with BLM policy or resource decisions without justification or supporting data that meet the substantive criteria listed above
- Comments that do not pertain to the planning area or scope of the RMP and EIS
- Comments that take the form of vague, open-ended questions

The analysis team established an issue coding structure for all substantive comments within CommentWorks® and used the coding structure to bracket and sort comments into logical groups or issue categories (e.g., air quality, cumulative impacts, and cultural resources). Table Y.1, "Issue Categories" (p. 2673) lists all issue categories identified for the Draft RMP and EIS.

Table Y.1. Issue Categories

Issue Categories		
Air Resources	Irreversible and Irretrievable Commitment of Resources	Rights-of-Way and Corridors
Areas of Critical Environmental Concern	Lands and Realty	Riparian-Wetland
Cave and Karst	Laws, Regulations, Guidance, and Process	Salable Minerals
Climate Change	Leasable Minerals – Coal	Socioeconomic Resources
Consultation	Leasable Minerals – Fluids	Soil
Cultural Resources	Leasable Minerals – Other	Special Status Species
Cumulative Impacts	Livestock Grazing Management	Travel and Transportation Management
Edit Grammar, Punctuation, Spelling, and Readability	Locatable Minerals	Tribal Treaty Rights
Environmental Justice	Methods and Assumptions	Unavoidable Adverse Impacts
Extension Request	Minerals - General	Vegetation
Fire and Fuels Management	National Environmental Policy Act	Visual Resource Management
Fish	Out of Scope	Water
Federal Land Policy and Management Act	Paleontological	Wilderness Characteristics
Greater Sage-Grouse	Planning Issues	Wild and Scenic Rivers
Health and Safety	Recreation	Wilderness Study Areas
Invasive Species, including Non-native and Pest Species	Renewable Energy	Wildlife

The BLM Interdisciplinary Team reviewed individual comments after the comments were assigned to an issue category and provided direction to develop a response. The comment analysis team then used the individual comments and Interdisciplinary Team direction to analyze, group, and summarize comments, and to develop responses to the summary comments.

When reviewing comments, the analysis team looked not only for each action or change requested by the public, but also for any supporting information to capture the comment and its context in its entirety. In doing so, paragraphs within a comment document might have been divided into several comments because the paragraphs contained more than one comment; conversely, multiple sections of a comment document might have been combined to form one coherent comment.

It is important to note that during the process of identifying individual comments and concerns, the BLM treated all comments equally. The BLM did not weigh comments based on organizational affiliation or status of commenters, and the number of duplicate comments did not increase the priority or merit of one comment over another. The process was not one of "counting votes," and the BLM did not make any effort to tabulate the exact number of people for or against any given aspect of the Draft RMP and EIS. Rather, the BLM focused on an understanding of the content of a comment, how it related to the Draft RMP and EIS, and appropriate responses and revisions to the Draft RMP and EIS.

Y.3. Commenter Demographic

This section summarizes commenter demographics based on information provided in comment documents. Demographic analysis allows the BLM to form an overall picture of issues, and a better understanding of who is submitting comments, the geographic distribution of commenters, their affiliations, and the format of the public comment documents.

Y.3.1. Geographic Representation

The BLM tracked the geographic representation for each comment document that included such information. Table Y.2, "Number of Comment Documents by Geographic Location" (p. 2674) identifies the number of comment documents received from individual geographic locations (excluding form letters). Figure Y.1, "Number of Comment Documents by Geography" (p. 2676) depicts the geographic distribution of comment documents received from within the planning area, from outside the planning area but within the State of Wyoming, and from outside Wyoming. The BLM received the most comment documents from commenters outside the planning area.

Table Y.2. Number of Comment Documents by Geographic Location

State	City	Number of Comment Documents
Alberta	Calgary	1
California	Carlsbad	1
California	Corte Madera	1
California	Redwood City	1
Colorado	Denver	11
Colorado	Fort Collins	1
Colorado	Grand Junction	1
Colorado	Ridgeway	1
District of Columbia	Washington	2
Georgia	Atlanta	1
Idaho	Boise	1
Idaho	Hailey	1
Idaho	Ketchum	1
Illinois	Murphysboro	1
Kansas	Lawrence	1
Massachusetts	Wellesley	1
Maryland	Rockville	1
Montana	Billings	1
Montana	Bozeman	2
North Dakota	Bismarck	1
New Jersey	Galloway	1
New Mexico	Santa Fe	1
New Mexico	Taos	1
New York	Brooklyn	1
Ohio	Cardon	1
Oklahoma	Oklahoma City	1
Oregon	Baker City	1
Oregon	Eugene	2
Oregon	Portland	1
Pennsylvania	Philadelphia	1
South Dakota	Black Hawk	1

State	City	Number of Comment Documents
Tennessee	Gatlinburg	1
Utah	Logan	2
Utah	Salt Lake City	2
Washington	Blaine	1
Washington	Deer Harbor	1
Washington	La Conner	1
Washington	Richland	1
Wyoming	Big Horn	3
Wyoming	Buffalo	4
Wyoming	Casper	4
Wyoming	Cheyenne	8
Wyoming	Cody	2
Wyoming	Douglas	3
Wyoming	Gillette	7
Wyoming	Glenrock	1
Wyoming	Kaycee	6
Wyoming	Lander	5
Wyoming	Laramie	1
Wyoming	Pavilion	1
Wyoming	Rock Springs	1
Wyoming	Sheridan	12
Wyoming	Wright	1
Unknown	-	22
Total	**-**	**134**

Note: Comments received through email that did not include mailing addresses or geographic representation accounted for 22 submissions. Note: Form letters were counted once based on the geographic location of the originating entity for the master form letter.

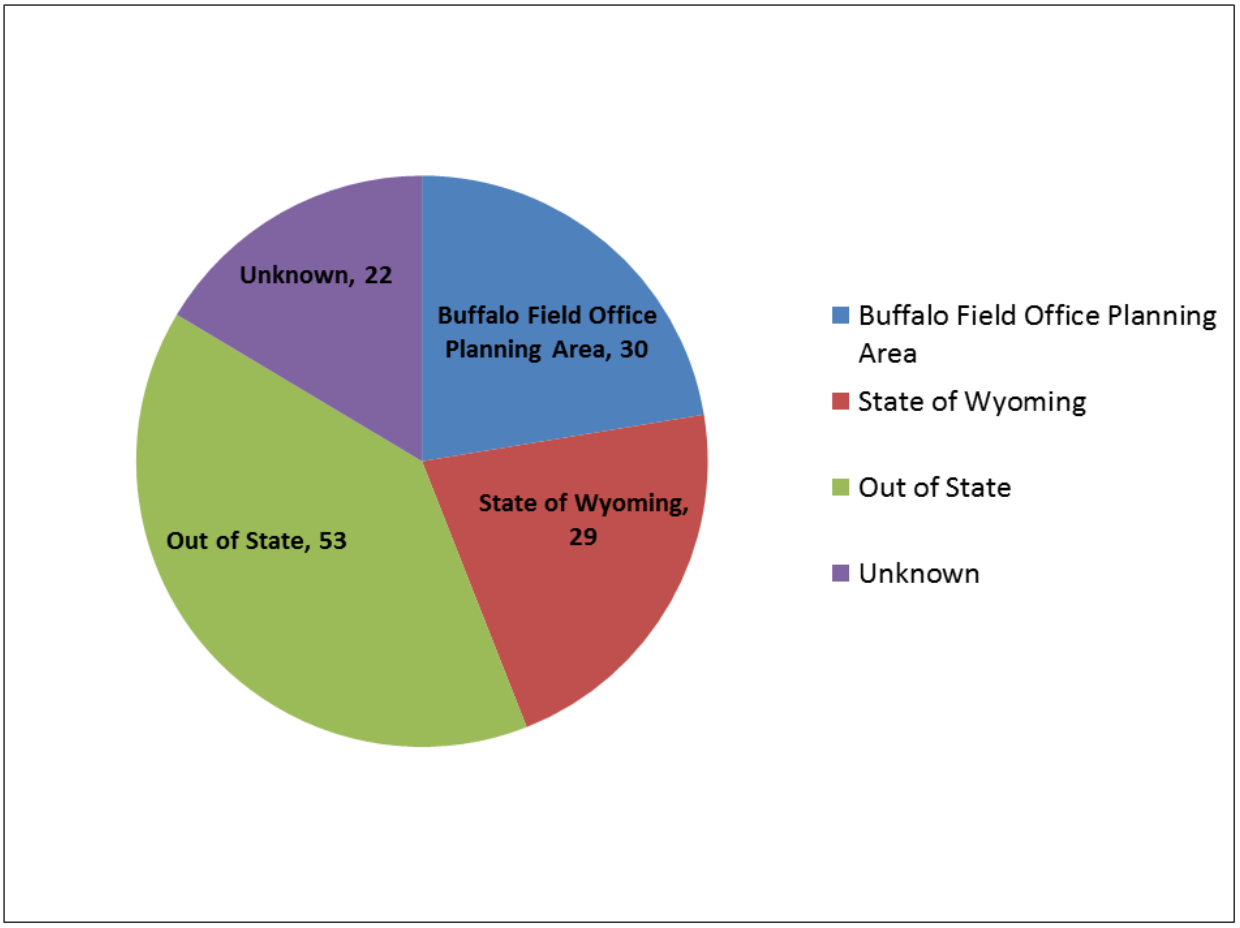

Figure Y.1. Number of Comment Documents by Geography

Note: Comments received through email that did not include mailing addresses or geographic representation accounted for 22 submissions. Note: Form letters were counted once based on the geographic location of the originating entity for the master form letter.

Y.3.2. Organizational Affiliation

The BLM received comments from a range of entities, as listed in Table Y.3, "Number of Comment Documents by Affiliation (excluding form letters)" (p. 2676)and shown on Figure Y.2, "Number of Comment Documents by Affiliation" (p. 2677). The BLM affiliated comment documents with a government or non-governmental organization if the comment document was received on official letterhead or was received through an official agency or organization email address. The BLM classified all other comment documents as unaffiliated individuals. The BLM received the most comment documents from unaffiliated individuals.

Table Y.3. Number of Comment Documents by Affiliation (excluding form letters)

Affiliation	Number of Public Response Documents
Federal Agency	6
State Agency	7
Local Government	7
Non-Governmental Organization	35
Private Industry	24

Affiliation	Number of Public Response Documents
Unaffiliated Individual	55
Total	**134**
Note: Form letters were counted once based on the geographic location of the originating entity for the master form letter.	

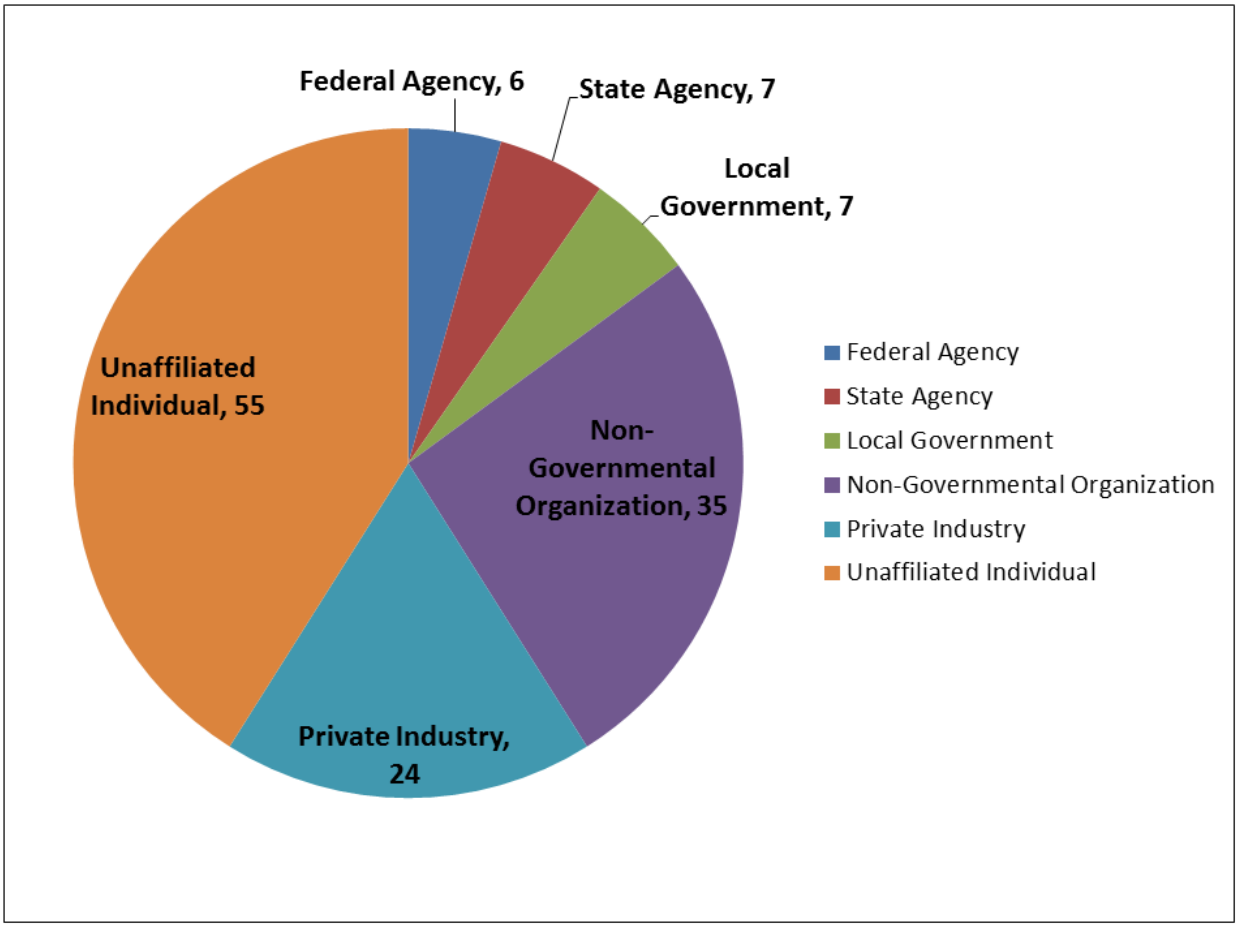

Figure Y.2. Number of Comment Documents by Affiliation

Y.3.3. Public Comment Document Method of Delivery

The BLM received comment documents through a variety of delivery methods, as listed in Table Y.4, "Number of Public Comment Documents by Method of Delivery" (p. 2677). The BLM received the most comment documents through email (101) and U.S. mail (32).

Table Y.4. Number of Public Comment Documents by Method of Delivery

Method of Delivery	Number
Email	101
U.S. Mail	32
ePlanning	1
Fax	0
Total	**134**

Y.3.4. Form Letters

The BLM received approximately 2,143 form letters. Form letters are standardized and duplicated letters that contain the same text or portions of text and comments. The BLM reviewed the form letters and extracted and analyzed any comments unique and supplemental to the form letter; however, the BLM considered comments with the same text as one comment. The BLM designated the first form letter from each originating entity as the "master" comment document and reviewed each subsequent form letter to ensure the content was identical to the master comment document. The BLM received form letters from at least 2 entities, for a total of 2 master comment documents, BFO-1030 and BFO-1115. The BLM received 1 form letter via U.S. mail; all other form letters arrived via email. When form letters included additional text, the BLM reviewed and processed them if they contained substantive individual comments.

Y.4. Analysis of Comments

The 134 public comment documents contained substantive and non-substantive comments. Representative non-substantive comments included requests to be added to the project mailing list, requests for a copy of the Draft RMP and EIS, personal preference or opinion, unsupported comments and questions, and comments that do not pertain to the Draft RMP and EIS.

In accordance with the BLM NEPA Handbook (H-1790-1), the BLM analyzed and responded to comments on the Buffalo Draft RMP and EIS if they were substantive and related to inadequacies or inaccuracies in the analysis or methodologies used; identified new impacts or recommended reasonable new alternatives or mitigation measures; or involved substantive disagreements on interpretations of significance. (See 40 Code of Federal Regulations 1502.19, 1503.3, 1503.4, 1506.6, and 516 DM 4.17). BLM NEPA Handbook (H-1790-1) identifies the following comment category examples and appropriate responses:

Substantive Comments

- **Question, with a reasonable basis, the accuracy of the information in the EIS.** Factual corrections should be made in the Proposed RMP and Final EIS in response to comments that identify inaccuracies or discrepancies in factual information, data, or analysis.
- **Question, with a reasonable basis, the adequacy of environmental analysis as presented.** Comments that express a professional disagreement with the conclusions of the analysis or assert that the analysis is inadequate might or might not lead to changes in the EIS. Interpretations of analyses should be based on professional expertise. Where there is disagreement within a professional discipline, a careful review of the various interpretations is warranted. In some cases, public comments might necessitate an evaluation of analytical conclusions. If, after reevaluation, the manager responsible for preparing the EIS does not think a change is warranted, the response should provide the rationale for that conclusion.
- **Identify New Impacts, Alternatives, or Mitigation Measures.** If public comments on a Draft RMP and EIS identify impacts, alternatives, or mitigation measures that were not addressed in the draft, the manager responsible for preparing the RMP and EIS should determine if they warrant further consideration. If they do, that manager must determine whether the new impacts, new alternatives, or new mitigation measures should be analyzed in either the Proposed RMP and Final EIS, a supplement to the Draft RMP and EIS, or a completely revised and recirculated Draft RMP and EIS.
- **Disagree with Significance Determinations.** Comments might directly or indirectly question determinations regarding the significance or severity of impacts. A reevaluation of these

determinations could be warranted and might lead to changes in the Proposed RMP and Final EIS. If, after reevaluation, the manager responsible for preparing the EIS does not think a change is warranted, the response should provide the rationale for that conclusion.

Non- Substantive Comments

- **Express Personal Preferences.** Comments that express personal preferences or opinions on the proposal do not require further agency action. They are summarized whenever possible and brought to the attention of the manager responsible for preparing the RMP and EIS. Although personal preferences and opinions might influence the final selection of the agency's preferred action, they generally will not affect the analysis.
- **Other.** In addition to the five categories from the NEPA Handbook described above, the BLM added a sixth category named "other" which includes requests for copies of the Draft RMP and EIS, requests to be added to the project mailing list, and comments outside the scope of the RMP and EIS. These comments are considered non-substantive and do not require further agency action.

Y.4.1. Comment Submittals by Issue Category

Within the 134 received comment documents, the BLM identified 2,142 individual substantive comments covering a broad range of issue categories. The greatest number of substantive comments was associated with Greater Sage-Grouse (482), Air Resources (197), and Fish and Wildlife (181). Attachment A includes an index for users to identify their comment documents, and Attachment B includes all individual substantive comments and the issue category for each comment that can be used to identify the corresponding BLM comment and response summary. Both attachments are located on the Buffalo RMP website: http://www.blm.gov/wy/st/en/programs/Planning/rmps/buffalo.html.Table Y.5, "Number of Comments per Issue Category" (p. 2679) and Figure Y.3, "Number of Individual Comments by Issue Category" (p. 2681) identify the number of comments submitted by issue category.

Table Y.5. Number of Comments per Issue Category

Issue Category	Number of Comments Per Issue Category
Air Resources	197
Areas of Critical Environmental Concern (ACECs)	93
Cave and Karst	2
Climate Change	24
Cultural	69
Cumulative Impacts	16
Edit: Grammar, Punctuation, Spelling, and Readability	25
Extension Request	1
Fire and Fuels Management	17
Fish and Wildlife	181
Federal Land Policy and Management Act (FLPMA)	15
Greater Sage-Grouse	482
Health and Safety	4
Lands and Realty	7
Laws, Regulations, Guidance, and Process	26
Leasable Minerals – Coal	67
Leasable Minerals – Fluids	180
Livestock Grazing Management	75
Locatable Minerals	32

Issue Category	Number of Comments Per Issue Category
Minerals – General	7
Mitigation Measures	21
National Byways	4
National Environmental Policy Act (NEPA)	25
Paleontological	3
Range of Alternatives	16
Recreation	66
Renewable Energy	2
Rights-of-Way and Corridors	36
Riparian-Wetland	20
Scoping Process	1
Socioeconomic	63
Soil	62
Special Status Species	56
Travel and Transportation Management	22
Vegetation	9
Visual Resource Management	60
Water	101
Wild and Scenic Rivers	1
Wilderness Characteristics	39
Wilderness Study Areas	15
Total	**2,142**
Note: Duplicative comments in form letters were only counted once.	

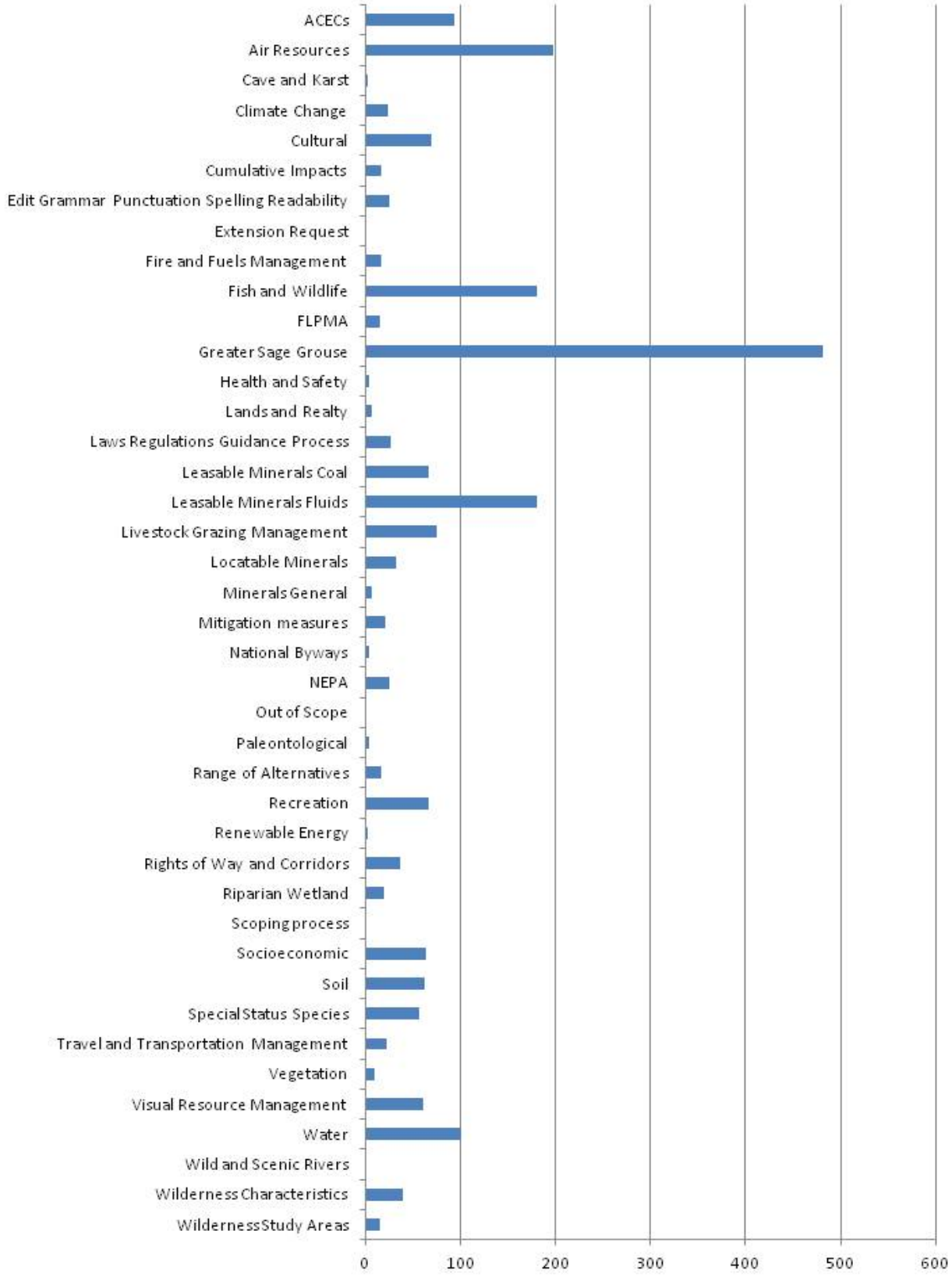

Figure Y.3. Number of Individual Comments by Issue Category

Y.4.2. Substantive Comment Summary and Response

To provide a user-friendly method of understanding the broad themes and topics of concern expressed in the substantive comments, the BLM grouped individual comments with similar topics and concerns and developed 111 summary comments and responses. Table Y.6, "Comment and Response Summaries" (p. 2683) lists the 111 summary comments and responses generally organized by BLM resource program and other appropriate issue categories (e.g., extension and hard copy requests), as described in Table Y.1, "Issue Categories" (p. 2673). The issue categories in Table Y.6, "Comment and Response Summaries" (p. 2683) can be used to track the summary comment and response to the individual comments presented in Attachment B.

Table Y.6. Comment and Response Summaries

Issue Category	Summary Number	Summary Comment	Summary Response
National Environmental Policy Act (NEPA)	1000-1	In order to avoid inconsistencies with Bureau of Land Management's (BLM's) policy and public confusion, commenters requested the Resource Management Plan (RMP) be modified to recognize that Wyoming's split estate law does not apply to situations where the mineral estate is owned by the federal government, and that statute and regulations implementing the statute are limited in application to state and private mineral estate.	The Proposed RMP complies with all applicable laws, regulations, and policies.
NEPA	1000-2	Commenters requested that county land use plans be considered in the design of the alternatives, analyses of specific resources, and to avoid duplication of protection measures for specific resources. Commenters requested the RMP recognize the Thunder Basin Grasslands Association's conservation strategy as an adaptive conservation and management strategy.	BLM crafted the management actions with the assistance of the Cooperating Agencies which included the three counties. Local plans were considered during alternative development, including the Thunder Basin Grasslands Association's conservation strategy.
Scoping Process	1001-1	The commenters requested further information regarding how scoping comments were addressed by the BLM, and the criteria used to determine if they were in or outside the scope of the Environmental Impact Statement (EIS).	Section 1.3.1 (Planning Process) and Section 2.3 (Alternatives Development Process) explain how scoping comments were addressed by BLM and the criteria used to determine whether were in the RMP's scope.
Range of Alternatives	1002-1	Commenters requested further explanation of the acreage of surface disturbance between the alternatives.	BLM actions can influence non-federal actions. For example, if an area is predominantly federal fluid minerals and BLM has closed the area to leasing the economic attraction of the non-federal minerals would be affected. See Appendix G (p. 1937) for specific activities. Most activities do identify greater foreseeable acreage affected in Alternative C than D. However, some activities such as habitat restoration forecast more activity under Alternative D (77,560 acres of Greater Sage-Grouse habitat restoration) than C (none).

Issue Category	Summary Number	Summary Comment	Summary Response
Range of Alternatives	1002-2	Commenters expressed concern that the BLM failed to consider a full range of reasonable alternatives for analysis. Specifically, commenters requested the BLM consider and analyze an alternative that would reduce energy development or otherwise prevent impacts to water, air, and land resources, a "no grazing" alternative, and a "50% reduction in grazing" alternative to address the presence of endangered, special status, and sensitive species in the planning area.	The BLM developed and analyzed alternatives in the Proposed RMP and Final EIS using the best available information and in compliance with federal laws, guidelines, and policies. The purpose of the RMP, as explained in Section 1.21, is to provide direction for managing public lands in accordance with BLM's multiple use mandate. Recognizing the Nation's need for domestic sources of minerals, food, timber, and fiber, and incorporating the requirements of the Energy Policy Act of 2005 (Pub. L. 2005) are examples of the multiple uses BLM accommodates. Section 2.6, "Alternatives Considered, but not Carried Forward for Detailed Analysis" (p. 94) describes alternatives the BLM considered but did not carry forward for detailed analysis including no livestock grazing and administrative closures to mineral development. These alternatives generally did not meet the purposes and need of the RMP, did not recognize valid existing rights, or, in the case of no livestock grazing, and were determined by the BLM to not be warranted based on the evaluation of resource conditions and conflicts.
Range of Alternatives	1002-3	Commenters requested additional information as to why a phased development alternative was rejected from detailed analysis and why Alternative B was not selected. Commenters generally requested the BLM to consider specific aspects of Alternative B, such as preventing development in poor reclamation suitability areas, as part of a new Preferred Alternative.	The primary purpose of the RMP is to identify where fluid mineral development is appropriate, not to determine how or at what rate fluid minerals could be developed. In addition to the reasons identified in the *Alternatives not Carried Forward. for Detailed Analysis* section (Section 2.42), phased development was not considered because an RMP is foremost an allocation document.

Issue Category	Summary Number	Summary Comment	Summary Response
Mitigation Measures	1003-1	Commenters requested that BLM re-evaluate its definition and use of “mitigation” for cultural resources throughout the document.	BLM clarified the definition of “mitigation” to indicate that adverse effects to historic properties must be resolved prior to project approval "to develop and evaluate alternatives or modifications to the undertaking that could avoid, minimize or mitigate adverse effects on historic properties" (36 Code of Federal Regulations [CFR] 800.6(a)) and that minimization is not the same as mitigation.
Mitigation Measures	1003-2	Commenters generally supported mitigation measures that can be applied on private lands that result in no loss of long-term landowner management sovereignty. Commenters supported the assessment of funds from energy developers to be invested in Term Limit Habitat Contract Accounts when substantial adverse impacts to wildlife and associated habitats cannot be avoided. Commenters supported the non-federal government purchase of deeded lands as a secondary conservation/mitigation response.	For those impacts that cannot be sufficiently avoided or minimized onsite, the BLM will implement effective measures to offset (or compensate for) such impacts. A mitigation strategy for BLM-administered lands will comply with BLM’s Regional Mitigation Manual Section (MS) 1794.
Mitigation Measures	1003-3	Commenters requested that monitoring and adaptive management plans should link to the mitigation obligations established through regional mitigation plans or individual projects and must measure the effectiveness attributable to actions required for compensatory mitigation.	For those impacts that cannot be sufficiently avoided or minimized onsite, the BLM will implement effective measures to offset (or compensate for) such impacts. A mitigation strategy for BLM-administered lands will comply with BLM’s Regional Mitigation Manual Section (MS) 1794.
Mitigation Measures	1003-4	Commenters requested the BLM develop regional conservation mitigation plans for each geographic area, pooling habitat conservation resources and targeting conservation efforts in high priority areas.	Wyoming BLM will coordinate with the State of Wyoming in implementation planning to develop a statewide adaptive management plan and a framework to evaluate causal factors. The adaptive management plan will identify adaptive management triggers; indicators to be measured; and appropriate effective mitigation, restoration, and reclamation actions, including targets and benchmarks for responses. The plan will include both short-term and long-term monitoring. The adaptive management plan will guide the development of project level adaptive management strategies.

Issue Category	Summary Number	Summary Comment	Summary Response
Extension Requests	1004-1	Commenter requested that the BLM extend the comment period by 45 days to allow more time to review and comment on the Draft RMP and EIS.	The public comment period for the plan is consistent with BLM regulations and policy. BLM is committed to maintaining the 90-day public comment period in order to meet the court-ordered deadline for the U.S. Fish and Wildlife Service to reach a final determination on listing the Greater Sage-Grouse under the Endangered Species Act (ESA). Given the critical and time-sensitive nature of planning issues related to Greater Sage-Grouse, the BLM will be unable to extend the 90-day public comment period.
Federal Land Management and Policy Act (FLPMA)	1005-1	Commenters asserted that Alternative D exceeds BLM's authority under FLPMA by incorporating management actions that would restrict development and activities on private land, indicating FLPMA authorizes the BLM to regulate air quality, and by suggesting areas are closed to oil and gas leasing, which is effectively a withdrawal under FLPMA. Commenters stated the BLM should clarify that only the Secretary of the Interior could withdraw the entire planning area for oil and gas leasing under FLPMA and there are specific procedures under FLPMA for withdrawals. Commenters indicated that Alternative D should not be selected because it would result in unnecessary or undue degradation of public lands and under FLPMA, this should not occur.	BLM is responsible for allocating where mineral resources can be leased; BLM does not regulate where a lessee sells the mineral resources that it has leased, much of which is used domestically. The Draft RMP did not indicate that BLM regulated air quality. Decisions made in the RMP are limited to BLM-administered lands (surface and minerals). BLM acknowledges their decisions may influence activities on non-federal lands but the purpose of the RMP is not to limit development on private lands. The BLM is authorized to close areas to oil and gas leasing in the planning process, no withdrawal is necessary. The commenters' suggestion that a withdrawal is required is legally incorrect. In addition, Alternative D includes sufficient resource protections to prevent unnecessary and undue degradation of public lands.
FLPMA	1005-2	Commenters requested the BLM assess whether allowing coal leasing for coal aimed at export markets meets Congressional directives under the 2005 Energy Policy Act and what the impact is to our national energy and economic security. Commenters also requested the BLM fully assess environmental and socioeconomic impacts related to coal exports.	BLM is responsible for allocating where mineral resources can be leased; BLM does not regulate where a lessee sells the mineral resources that it has leased, much of which is used domestically. Therefore, it is not appropriate for BLM to address impacts related to coal exports.

Issue Category	Summary Number	Summary Comment	Summary Response
Laws, Regulations, Guidance, Process	1006-1	Commenters expressed general concern of various management actions in regards to split estate lands. Commenters requested that BLM require additional bonding from oil and gas companies for use in compensating landowner if their private lands are being irreparably damaged.	Decisions made in the RMP are limited to BLM-administered lands (surface and minerals). BLM acknowledges that its decisions may influence activities on non-federal lands but the purpose of the RMP is not to limit development on private lands. Additional bonding and landowner consent are national level issues which are beyond the scope of the Buffalo RMP. In addition they are implementation level practices not at the allocation level which is the focus of the RMP.
Laws, Regulations, Guidance, Process	1006-2	Commenters requested that BLM provide better documentation of relevant regulatory (CFR), state, and federal law citations that enable the actions presented in the document.	Footnotes have been added to reference those actions that the BLM authorizes. In addition, both current Wyoming Greater Sage-Grouse executive orders and the current BLM Greater Sage-Grouse policies have been added to the new data section.
Laws, Regulations, Guidance, Process	1006-3	Commenters stated that BLM needs greater flexibility in order to manage public lands encumbered by existing leases, permits, grants, and other authorizations such as related to bonding and landowner consent on reclamation requirements.	The BLM Field Office level is bound by the national bonding regulations and does not have the ability to increase bond requirements. The regulations include a process to assess risk and ensure proper bonding on a case by case basis. Bond amount are periodically reviewed. BLM is committed to work with landowners and consider their views on reclamation requirements as required by Onshore Order #1.

Issue Category	Summary Number	Summary Comment	Summary Response
Laws, Regulations, Guidance, Process	1006-4	Some commenters asserted that BLM failed to properly undertake or complete the Area of Critical Environmental Concern (ACEC) designation process, and continued to state that they did not agree with using the designation of the ACECs as a means to enforce management prescriptions on private surface lands. Commenters requested that the RMP recognize the Thunder Basin Grassland Prairie Ecosystem Association Candidate Conservation Agreement (CCA)/Conservation Agreement as an adaptive conservation and management strategy that meets the stated goals and objectives of the RMP.	The ACEC evaluation forms were included as Appendix S (p. 2531) in the Draft RMP. BLM worked with cooperating agencies involving designation of ACECs. BLM can identify the Thunder Basin (and Statewide Greater Sage-Grouse) CCA as a source of BMPs (discretionary mitigation measures). However, if the measures from a draft CCA are included in the BLM's RMP as required management actions, those measures are automatically no longer considered appropriate for the CCA because they are a required element of the authorized agency's guiding document. CCAs and Candidate Conservation Agreements with Assurances are by their very definition, voluntary, so to include measures in the agreements that are required would be counter to the objectives of the agreement.

Issue Category	Summary Number	Summary Comment	Summary Response
Cumulative Impacts	1007-1	Commenters recommended that the BLM further analyze cumulative impacts regarding multiple resources, resource uses, socioeconomic conditions, and special designation areas. Specifically, commenters requested a higher degree of analysis of cumulative impacts to soil, wildlife habitats, air quality, and surface and groundwater quality and quantity from the combined impacts of fracking, coalbed natural gas (CBNG), uranium, and coal occurring in close proximity to each other.	Cumulative impacts included those impacts on the environment that resulted from the incremental impact of the action added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions (40 CFR 1508.7). CEQ guidance directs cumulative impact analysis to focus on important issues of national, regional, or local significance. This analysis focuses on RMP actions that, when combined with other past, present, and reasonably foreseeable future actions, would collectively be significant. Not all issues identified for direct or indirect impact assessment in the RMP are analyzed for cumulative effects. Because of the wide geographic scope of a cumulative impact assessment and the variety of activities assessed, cumulative impacts are commonly examined at a more qualitative and less detailed level than are direct and indirect impacts. Public documents prepared by federal, state, and local government agencies are the primary sources of information regarding past, present, and future actions considered in the cumulative effects analysis. The reader should also review Appendix G (p. 1937) where foreseeable development is identified by individual resource.

Issue Category	Summary Number	Summary Comment	Summary Response
Air Resources	1008-1	Commenters questioned the authority of the BLM to regulate air quality in the region and the State of Wyoming overall and requested clarification of the scope of BLM's authority in regulating air quality.	The RMP is a planning level document and does not authorize or guarantee the development of resources within the planning area without further NEPA review. At this time, the BLM-WY does not require mitigation for greenhouse gases (GHGs) which have no ambient standards by which to establish a compliance threshold. The BLM provides for compliance with all current air quality rules and regulations, both state and federal, for BLM-authorized activities. GHG emissions will be reduced in part due to the regulations in 40 CFR 60, Subpart OOOO- Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution.
Air Resources	1008-2	Commenters requested additional reference to applicable air quality laws and policies and that management demonstrate compliance with Wyoming DEQ regulations and other applicable regulations. Specifically, commenters requested that BLM must ensure that its proposed Buffalo Air Resources Management Plan is consistent with the Air Memorandum of Understanding (MOU) entered into by the Department of the Interior (DOI).	The text has been updated to include appropriate references to applicable air quality laws and references and compliance with regulations. The BLM developed an Air RMP (Appendix N (p. 2479)) in conjunction with the Wyoming DEQ and Environmental Protection Agency (EPA) Region 8 to address how the agency will evaluate and mitigate air impacts for future development in the planning area.
Air Resources	1008-3	Commenters questioned the baseline data used in the affected environment, stating that the BLM did not use the most recently available data.	More detailed and accurate emissions estimates will be required for future development in the planning area. The BLM recognizes that stricter regulations for oil, gas, and coal development will be enforced over the next decade; however, the emissions estimates in the RMP are appropriately conservative for disclosure purposes and will be retained for the Final EIS.

Issue Category	Summary Number	Summary Comment	Summary Response
Air Resources	1008-4	Commenters expressed concern about inadequate, inaccurate or insufficient information/data in the air quality impact analysis. Commenters questioned the use of qualitative data rather than quantitative data in assessing potential air quality impacts, and requested that air quality modeling be conducted as part of the assessment. Or, commenters requested additional information and assurance for modeling that will be conducted at the implementation level.	Except for natural gas, oil, and CBNG, emissions information presented in the Draft EIS is from sources and activities operating on BLM-administered lands where the BLM has responsibility and authority for managing the land and resources. For natural gas, oil, and CBNG, information was not available for these activities in areas not under the jurisdiction of BLM. The RMP does not address emission sources that the BLM has no authority or responsibility for managing, such as existing power plants which are major stationary sources permitted and regulated by the Wyoming DEQ. For the development of the Buffalo RMP, no air quality modeling was conducted. The United States Department of the Interior, the United States Department of Agriculture, and the EPA recently entered into a MOU regarding how and when air quality modeling for oil and gas projects will be conducted. In addition, BLM maintains the ultimate decision making authority for determining when modeling is necessary. The decision to model a particular project or geographic area is made on a case-by-case basis and is dependent on availability of input data, geographic and meteorological conditions, current state of air quality, and proximity of sensitive air sheds or receptors. Project specific requirements will be determined during the development of an EIS and subsequent Record of Decision for projects.

Issue Category	Summary Number	Summary Comment	Summary Response
Air Resources	1008-5	Commenters also indicated that the analysis failed to clearly address or present whether or not "levels of concern" have been reached for specific criteria pollutants including oxides of nitrogen and sulfur. Commenters questioned why a thorough cumulative impact assessment of air quality was not included for the Planning Area, and questioned the boundary defined in the cumulative impacts assessment.	BLM included foreseeable development within the cumulative impacts analyses. Cumulative impacts included those impacts on the environment that resulted from the incremental impact of the action added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions (40 CFR 1508.7). In addition, a cumulative impacts analysis for the Powder River Basin (PRB) is being completed as part of the PRB II Coal Review (release in 2014). The PRB will be included the cumulative impacts modeling being completed for the Montana RMP modeling effort (underway).
Air Resources	1008-6	Commenters expressed concern that Alternative D provided insufficient or unrealistic management actions for mitigation measures.	The Buffalo Air Resources Management Plan describes the BLM's general approach to mitigation of air quality impacts and includes a table of sample emission reduction strategies for oil and gas development. The application of mitigation measures will be determined on a project specific basis as guided by the mitigation framework in the RMP.
Climate Change	1009-1	Commenters expressed concern that although impacts from climate change are described in the document, the BLM does not provide management actions or mitigation measures to address those impacts. Some commenters insisted the BLM incorporate more climate change planning in the RMP and EIS.	The RMP is a planning level document and does not authorize or guarantee the development of resources within the planning area without further NEPA review. The BLM does not require mitigation for GHGs which have no ambient standards by which to establish a compliance threshold. The BLM must ensure that authorized activities demonstrate compliance with all current air quality rules and regulations, both state and federal. GHG emissions will be reduced in part due to the regulations in 40 CFR 60, Subpart OOOO-Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution.

Issue Category	Summary Number	Summary Comment	Summary Response
Climate Change	1009-2	Commenters stated that BLM fails to sufficiently analyze cumulative and incremental effects of coal, oil, and gas development on climate change in the RMP. Some commenters indicated the proposed plan did not account for the impacts of livestock grazing on climate change while other commenters indicated livestock grazing does not impact air quality.	The BLM does not have the tools or resources to analyze climate change impacts. The BLM can only reasonably quantify and disclose GHG emissions for the alternatives and put that estimation into the context as far as a percentage of the climate change that is occurring, and the BLM has disclosed the additional GHG contribution that would result from the planning area alternatives. Additional discussion of the current regulatory framework for GHGs and recent Intergovernmental Panel on Climate Change (IPCC) reports have been included in Chapters 3 and 4 of the RMP. Chapter 3 mentions livestock grazing in the context of Climate Change.
Climate Change	1009-3	Additionally, commenters requested quantification of air emissions data or that the BLM conduct air quality modeling.	At the time the analysis was conducted, the latest available emissions factors were used. The data has been updated in the Final EIS. For the development of the Buffalo RMP, no air quality modeling was conducted. The United States Department of the Interior, the United States Department of Agriculture, and the EPA recently entered into a MOU regarding how and when air quality modeling for oil and gas projects will be conducted. Furthermore, the Final EIS has been updated to elaborate on the MOU and why modeling was not conducted. In addition, BLM maintains the ultimate decision making authority for determining when modeling is necessary. The decision to model a particular project or geographic area is made on a case-by-case basis and is dependent on availability of input data, geographic and meteorological conditions, current state of air quality, and proximity of sensitive air sheds or receptors. Project specific requirements will be determined during the development of an EIS and subsequent Record of Decision (ROD) for projects.

Issue Category	Summary Number	Summary Comment	Summary Response
Climate Change	1009-4	Commenters requested that the BLM recognize the President's administration call to put forth a Climate Action Plan. Other commenters requested that the BLM consider a transition towards a renewable energy alternative.	The BLM provides for compliance with all current air quality rules and regulations, both state and federal, for BLM-authorized activities. At this time, EPA is working to develop GHG regulations. However, the primary focus is New Source Performance Standards for electric generating units (EGUs). Until such time as additional GHG emissions sources are regulated, the BLM does not require mitigation for an unregulated pollutant with no overarching air quality standard. The BLM has a number of renewable energy projects within the state, however, the Reasonable Foreseeable Development (RFD) for the planning area relies heavily on the input and interest for further development by local industries. At this time, there has not been an expressed interest in renewable energy projects in the Buffalo planning area. However, there are several projects completed or underway within other regions of Wyoming that are better suited to siting and developing renewable energy resources.

Issue Category	Summary Number	Summary Comment	Summary Response
Soil	1010-1	Commenters expressed concern over the baseline data used to assess impacts to soil resources and requested additional specificity and substantive text edits within the *Affected Environment* section, including the determination of soil health and quality, soil order descriptions, regulations affecting soils, and additional soil erosion parameters used for analysis. Commenters noted a need for additional information on the Soil, Water, and Air Program and what parameters were used to create the WEB Soil Survey map.	State Soils Geographic Database (STATSGO2) was used (Analysis of the Management Situation chapter 2, 2–11–13) for the relative proportion and general description of the soils in the planning area. The BLM provided clarifications and edits based on the comments received. BLM requires site-specific construction, stabilization, and reclamation plans for all surface-disturbing activities to assure soil quality and other resources are protected while providing for multiple land uses. A site specific analysis will include an onsite field investigation to confirm the presence or absence of key features due to the level of detail of the Natural Resources Conservation Service (NRCS) Order 3 soil surveys. The onsite investigation will determine the detail of the construction, stabilization, and reclamation plans needed for the NEPA analysis. This information will determine the significance of the impacts and whether the impacts can be mitigated adequately to avoid undue and unnecessary degradation. These details are in addition to other BLM regulatory documents. The proposed surface disturbance will be evaluated by its potential for reclamation and restoration within site-specific NEPA analyses. Where reclamation is determined to be challenging, BLM may include mitigation measures, relocate the activity to a more suitable soil type, or deny the authorization. The WEB parameters used to create the thematic map is "source of reclamation material."

Issue Category	Summary Number	Summary Comment	Summary Response
Soil	1010-2	Comments regarding the soil impact analysis stated that Alternative D did not do enough to protect soil resources with preference given to Alternative B, and others stated that Alternative B was overly restrictive and citing examples. Commenters noted that the impacts analysis was flawed because the existing mapping was too coarse to analyze impacts to minor soil units; other commenters requested clarification on the methods used to determine impacts to soil resources. There was confusion regarding the definition and classification of the terms "miscellaneous soils," "soils with poor reclamation suitability," "soils with severe erosion hazard," and "limited reclamation potential" (LRP) areas. Commenters had questions regarding impacts within LRP areas on BLM mineral estates, and requests for additional detailed, quantitative, science-based, and enforceable management provisions for soil resources during site-specific planning processes.	BLM has determined that Alternative D is sufficient to conserve the soil resource. Reclamation standards prescribed by other resource values will be applied to the soil resource as appropriate. As part of the RMP process the BLM is required to look at a range of alternatives. Alternative B is a resource protection alternative and is within the bounds of the process. Definitions of terms can be found in Chapter 3 and/or in the glossary. LRP areas are of limited acreage in the planning area. BLM soil program guidance is established under BLM Manual Section 7100, Soil Resource Management, which focuses on BLM's relationship with the National Cooperative Soil Survey (NCSS) and describes program goals and objectives, organization, management roles and responsibilities, and applicable authorities and regulations. BLM Handbook H-7100-1 Soil Inventory, Monitoring, and Management (Final Draft September 21, 2010) provides BLM personnel with information, guidance, and direction related to the inventory, monitoring, assessment, and management of soil resources on public lands. To help implement the many laws, rules, and regulations, the BLM Soil Program relies on various guidance documents developed by BLM and other agencies. Additional BLM soil resource information is available in the soil resources section of the BLM Soil, Water, and Air Program (http://www.blm.gov/wo/st/en/prog/more/soil2/soil2.html), and the BLM soil web page (http://www.blm.gov/nstc/Soil2007/index.html).

Issue Category	Summary Number	Summary Comment	Summary Response
Soil	1010-3	With respect to reclamation of soil resources, commenters expressed concern over reclamation plan requirements on private lands, how reclamation success with respect to soils was to be determined, a perceived lack of clarity over reclamation plan requirements for all oil and gas drilling operations, and stipulations for erosion and other soil mitigation measures within a broad planning document like the RMP as opposed to within site-specific planning processes. A number of commenters urged the BLM to reconsider its choice of Alternative D in light of reclamation concerns.	The Soils Exception Criteria appendix (Appendix I in the Draft RMP and EIS) has been removed since the requirements are included in the site specific construction, stabilization, and reclamation plan, Appendix O (p. 2495), and Appendix H (p. 1959).
Water	1011-1	Commenters questioned the BLM's authority to regulate surface water quality, which they noted was under the jurisdiction of Wyoming DEQ and requested the BLM clearly state that Wyoming DEQ has primacy regarding water issues.	Throughout Chapter 3 BLM references the State of Wyoming's and other federal agencies authority over water resources. Great effort was taken by the BLM during the preparation of this document to ensure that proposed management actions were tied directly to the agency that has the appropriate regulatory authority.
Water	1011-2	Commenters requested that BLM provide an analysis of surface and groundwater quality impacts related to coal, uranium, and oil production. Commenters requested the analysis consider the beneficial uses of produced water, impacts of discharged water, long-term buildup of sediments, and groundwater depletion. Additionally, commenters requested that the additional information be circulated for full public review in a supplemental or revised Draft RMP/EIS.	BLM added additional discussion relative to surface and groundwater impacts and beneficial uses. The additional information did not result in changes to the proposed action or any other alternative or present any significant new circumstances or information relevant to environmental concerns; therefore a supplemental or revised Draft RMP/EIS are not necessary.

Issue Category	Summary Number	Summary Comment	Summary Response
Water	1011-3	Commenters indicated that the *Water* section was missing information demonstrating compliance with Wyoming water laws. Additionally, commenters indicated that the analysis failed to use the most recent data or current scientific reports pertaining to the characterization and classification of specific water resources and their uses in the planning area. Commenters expressed concern that the RMP was devoid of modeling in its cumulative effects analysis of water quality.	The EIS has been revised to include a discussion regarding the information commenters felt was missing The BLM edited the Water *Cumulative Impacts* section to better address mineral development issues.
Water	1011-4	Commenters questioned the validity of statements and language used to support BLM management decisions pertaining to water quality standards in the planning area, and requested clarification on implementation of proposed BLM water monitoring actions. Commenters requested that the BLM include additional protective management for water resources	The RMP is an allocation document. Any surface-disturbing project will be evaluated under a site specific NEPA document. Such impacts will be evaluated there. Examples of issues that will be considered on the individual projects will be discussed in the *Methods and Assumptions* section of the *Water* section in Chapter 4 of the RMP as well as Appendix W (p. 2623) that has been added to the RMP.
Water	1011-5	Commenters requested the BLM use a buffer of 500 feet near springs, reservoirs, perennial streams, riparian/wetland areas, and aquatic habitat. In addition, commenters requested the BLM use a buffer of 750 feet for water bodies that are impaired or become impaired in the future. Commenters also requested that the BLM coordinate with Wyoming DEQ regarding water discharge from CBNG operations.	BLM has determined a 500-foot restriction (Controlled Surface Use [CSU]) to be sufficient; additional analysis has been added.
Water	1011-6	Commenters requested the BLM disclose all methods that they would use to enhance production of existing CBNG wells. In addition, commenters requested the EIS analyze potential impacts of these techniques to groundwater.	An oil and gas operations appendix (Appendix V (p. 2599)) and a water management plan appendix (Appendix W (p. 2623)) have been added to the RMP.

Issue Category	Summary Number	Summary Comment	Summary Response
Cave and Karst	1012-1	Commenters requested clarification regarding the prohibition of surface-disturbing activities near the entrance of caves, specifically if livestock grazing would be considered a surface-disturbing activity, and what method would be used to enforce the buffers around cave entrances (e.g., fences).	The definition of the term "Surface-Disturbing" can be found in the *Glossary* section of Volume 3 of this document. In general, livestock grazing is not considered a surface-disturbing activity. However, the Proposed RMP for Cave-1007 would restrict livestock from cave entrances, but this would not require a buffer. If a barrier was required to prevent livestock access into a cave, it would be placed in the cave entrance or as near to the entrance as possible. The type of barrier proposed for installation would be analyzed through the NEPA process at the project implementation phase to ensure compliance with resource management goals and objectives.
Mineral – General	1013-1	Commenters requested more information regarding carbon sequestration projects in the Buffalo planning area including any programmatic planning, approval of specific projects, and why these projects would be considered rights-of-way projects.	CCS still remains a mostly untested methodology, and certainly still unproven to be effective and safe in the long-term. Current interim guidance is that CCS projects will be authorized as Land Use Applications and Permits, a type of right-of-way (ROW) (see Washington Office [WO] Instruction Memorandum [IM]-2012-035, http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2012/IM_2012-035.html). The Buffalo Field Office (BFO) has not conducted planning for CCS projects, as none have yet been received here yet. Should any proposals be received by BFO, either an RMP Maintenance Action or Amendment may be necessary to capture and address impacts of such projects.
Mineral – General	1013-2	Commenters asserted that phased development needs to be prioritized so that reclamation occurs before new development proceeds. Commenters requested clarification of where the BLM addressed management and leasing actions for mineral and energy development to protect natural, biological and cultural resources.	Given the extent of non-federal mineral ownership within the planning area, a phased development alternative regulating when development could occur would not allow compliance with the requirements to ensure that leased federal minerals are fully developed and that production on non-federal leases does not drain federal minerals.

Issue Category	Summary Number	Summary Comment	Summary Response
Mineral – General	1013-3	Commenters were concerned with the lack of consistency in the Draft RMP language regarding management actions, surface occupancy, wildlife buffers or closures, and viewshed restrictions as applied to BLM split estate and BLM surface ownership lands throughout the document, as well as language regarding Notices of Intent and Plans of Operation.	The socioeconomics analysis (Section 4.8) discusses the effects of the various alternatives, including surface occupancy and wildlife restrictions, on socioeconomic resources. Correct terminology is "Notice" for locatable minerals, and "Notice of Intent" for geophysical.
Locatable Minerals	1014-1	Commenters expressed concern that In-Situ Leach uranium mining efforts could compromise the future development of oil and gas resources. Commenters asserted that given its multiple-use mandate, the BLM must protect property rights owned by the public and leases owned by oil and gas operators. Additionally, commenters requested additional analysis related to the historical and potential impacts from In-Situ Leach locations.	Currently, all subsurface impacts from uranium In Situ Recovery (ISR) mining-related activities are overseen and regulated by Nuclear Regulatory Commission (NRC), EPA, and Wyoming DEQ, via a number of laws, regulations, and policies. BLM has no administrative or regulatory management capacity in this matter. However, BLM is working with Wyoming Oil and Gas Conservation Commission (WOGCC) to ensure that no further oil/gas-containing formations in the planning area are approved for injection of wastes, including those of uranium operations. However, typical fluid wastes from uranium ISR operations contain only low-levels of radioactivity, at the most, and are therefore not considered to be harmful.
Locatable Minerals	1014-2	Commenters asserted that impacts to locatable minerals be reexamined and revised with respect to correcting trend, Reasonable Foreseeable Action (RFA), and forecasting information. Commenters requested the BLM provide more information regarding uranium disposal and its impacts. Commenters requested updated data and related to current and historical market value and research on mineral potential.	Recent trends and likely future trends have been updated for more recent figures and forecasts. No permitted uranium disposal sites occur on BLM-administered lands. BLM ensures accepted Notices and approved Plans of Operations (for operations containing at least some BLM-administered lands) would not result in unnecessary or undue degradation of public lands, per 43 CFR 3809.415. Transport and disposal of radioactive waste and contaminated materials is regulated, monitored, and enforced by NRC, EPA, and Wyoming DEQ under the auspices of numerous laws, regulations, and policies. BLM has no administrative responsibility over these issues.

Issue Category	Summary Number	Summary Comment	Summary Response
Locatable Minerals	1014-3	Commenters expressed concern that alternatives D and B showed no difference in effects to locatable mineral resources, the impact assessments were inconsistent or contradictory, and the analysis should include impacts to groundwater and aquifers. Commenters indicated ACEC designations and the likely effects on the federal locatable minerals resource were in disagreement and the potential impacts remain unknown. Commenters stated that half of the authorized and pending locatable minerals projects occur in or near the potential ACECs and the BLM should to take this into account in the impacts analysis.	The Locatable Minerals analyses were reviewed, the impact analyses were performed appropriately. Potentially contradictory language and acreage numbers have been clarified. The BLM also updated text in Chapter 4 regarding impacts from designated ACECs by including language that "actual impacts are unknown, but likely to be..."
Leasable Minerals Coal	1015-1	Commenters expressed concern the Preferred Alternative favors the development of coal over the development of oil and gas resources in the planning area.	Existing leases will be handled under WO IM 2006-153. Coal mines and oil and gas development are not compatible at the same time. If a coal mine has to avoid an oil and gas well the coal that is avoided will be lost and a waste of the coal resource will happen. The oil and gas resource that is deeper than the coal resource will not be lost but may be uneconomical to re-drill. In those cases where the oil and gas resource has not been developed no loss to the oil and gas resource will occur.
Leasable Minerals Coal	1015-2	Commenters requested additional and updated information and data regarding historical, present, and future coal production and updated coal lease data. Commenters questioned the BLM's description of future coal production in the Planning Area.	The *Affected Environment* section has been updated with the most current available data.

Issue Category	Summary Number	Summary Comment	Summary Response
Leasable Minerals Coal	1015-3	Commenters stated the BLM should include a broader range of alternatives for coal (e.g., no coal leasing, less coal leasing).	The Code of Federal Regulations at 43 CFR 3420.1-4(e) presents four coal screens that must be applied during land use planning to identify areas of the coal resource acceptable for further consideration for leasing. As presented in the 2001 RMP update, these screens were applied to lands within the Buffalo planning area and coal decisions were updated in coordination with the U.S. Forest Service (USFS) and other cooperators. Areas that passed these screens became available for further coal leasing consideration. Changes have been made to the Final EIS to clarify the decision to carry forward the 2001 coal leasing management decisions.
Leasable Minerals Coal	1015-4	Commenters stated that existing coal mines have not been properly reclaimed and requested that stricter management actions be implemented to ensure reclamation is being completed.	Wyoming's coal mine reclamation is under the authority of the Wyoming DEQ and the Office of Surface Mining Reclamation and Enforcement, and as such, BLM has no jurisdiction to set coal mine reclamation policy.

Issue Category	Summary Number	Summary Comment	Summary Response
Leasable Minerals Coal	1015-5	Commenters requested more information regarding the process for determining new coal leases. Additionally, commenters questioned the current coal leasing process described in the RMP, and, specifically citing several outside studies, requested the BLM modify the discussion on coal leasing to reflect potential flaws in the current leasing process.	43 CFR 3420.1-4(e) presents four coal screens that must be applied during land use planning to identify areas of the coal resource acceptable for further consideration for leasing. As presented in the 2001 RMP update, these screens were applied to lands within the Buffalo Field Office planning area and coal decisions were updated in coordination with the USFS and other cooperators. Areas that passed these screens became available for further coal leasing consideration. The 2001 RMP update coal management decisions remain the basis for current coal management in the planning area. Those areas determined to be available for future coal leasing consideration will be carried forward in this RMP revision (Map 11). It is not the intent of the BLM to open lands outside of these areas to coal leasing with this RMP revision. A decision on coal lands outside of those already screened and determined to be available for further coal leasing consideration will be deferred for leasing determinations until an application to lease the coal in those lands is received. At such a time, the four coal planning screens will be applied to those lands and prior to leasing an amendment to this RMP will be required. Changes have been made to the Final EIS to clarify the decision to carry forward the 2001 RMP update coal leasing management decisions.

Issue Category	Summary Number	Summary Comment	Summary Response
Leasable Minerals Coal	1015-6	Commenters expressed concern that the RMP fails to apply federal coal management program land use planning screens.	43 CFR 3420.1-4(e) presents four coal screens that must be applied during land use planning to identify areas of the coal resource acceptable for further consideration for leasing. As presented in the 2001 RMP update, these screens were applied to lands within the Buffalo planning area and coal decisions were updated in coordination with the USFS and other cooperators. Areas that passed these screens became available for further coal leasing consideration. A decision on coal lands outside of those already screened and determined to be available for further coal leasing consideration will be deferred for leasing determinations until an application to lease the coal in those lands is received. At such a time, the four coal planning screens will be applied to those lands and prior to leasing an amendment to this RMP will be required. Changes have been made to the Final EIS to clarify the decision to carry forward the 2001 RMP update coal leasing management decisions.

Issue Category	Summary Number	Summary Comment	Summary Response
Leasable Minerals Fluid	1016-1	Commenters stated that there are various instances of inadequate, inaccurate, or insufficient information and/or data related to well production. Commenters asserted that use of inadequate data did not capture current production levels and cannot be used to accurately anticipate future trends. Commenters generally expressed support for a phased development approach. Commenters requested that the BLM acknowledge that it cannot impose stipulations or new restrictions on existing leases and particularly cannot impose new NSO restrictions on existing leases.	BLM has made edits to text to eliminate misinformation referenced by commenters. The AMS was prepared in 2008 and used as the baseline for the Affected Environment. The RFD, which is correlated with well production, was updated in 2012 to accurately anticipate new trends. Lease numbers, lease status and other current condition data have not changed sufficiently and would not further inform a decision maker. Phased development was an alternative considered but not forwarded to detailed analysis, see the *Alternatives Considered, but Not Carried Forward for Detailed Analysis* section in Chapter 2. Pages 495 and 496 explain BLM's stance on operating on split estate lands. If the surface owner's wishes are contrary to the BLM recommendations, the BLM will generally adopt the surface owner's request unless the request is contrary to the BLM's planning decisions, non-discretionary laws, current policy, or would result in avoidable significant impacts.

Issue Category	Summary Number	Summary Comment	Summary Response
Leasable Minerals Fluid	1016-2	Commenters requested that BLM should specifically identify honoring valid existing rights as one of the purposes of the RMP revision. Commenters asserted that it is insufficient for the BLM to suspend an oil and gas lease based on the notion that the oil and gas lease can be developed in the future. Commenters also requested that the BLM include information about the current status of idle and abandoned CBNG wells in the planning area in its assessment of the affected environment. Commenters expressed that the BLM should develop language in the RMP to encourage seismic exploration. In addition, commenters requested the BLM fully assess impacts related to increased truck traffic, noise, and light pollution. Commenters requested that the BLM show how they have complied with the requirements from the Pennaco decision.	Statements are made throughout the RMP including the planning criteria that valid existing rights will be honored. Existing leases will be handled under WO IM 2006-153. Coal mines and oil and gas development are not compatible at the same time. If a coal mine has to avoid an oil and gas well the coal that is avoided will be lost and a waste of the coal resource will happen. The oil and gas resource that is deeper than the coal resource will not be lost but may be uneconomical to re-drill. In those cases where the oil and gas resource has not been developed no loss to the oil and gas resource will occur. The analyses of truck traffic, noise, and light pollution are incorporated into each resource based on the RFD and RFA tables of the RMP. When approved, the RMP will replace other existing plans and will comply with the Pennaco decision.
Leasable Minerals Fluid	1016-3	In several instances, commenters requested BLM cite supplemental text and supporting regulations, rules, and scientific documents, as appropriate. Additionally, commenters offered technical corrections to various statements made in Appendix D (p. 1863). Specifically, commenters expressed concern that Appendix D (p. 1863) did not include sufficient reclamation. Commenters requested that management actions include more stringent restrictions in an effort to protect resources.	BLM reviewed and revised the text as necessary to include supplemental text/terminology, supporting scientific citations, supporting regulations, and rules, as appropriate. The RMP is a land use allocation document and does not address site specific authorizations that permit development of enhanced mitigation or reclamation plans.

Issue Category	Summary Number	Summary Comment	Summary Response
Leasable Minerals Fluid	1016-4	Commenters stated that the analysis of the RFD underestimates the potential for the discovery of minerals and oil and gas reserves, noting the large number of potential well sites identified in recent development proposals. Commenters requested that the BLM include additional clarification that the RFD does not represent a planning decision or development "cap." Commenters requested that the BLM should ensure it fosters development from so-called unconventional resource plays in the RMP.	It was assumed during the creation of the surface disturbance calculations that a horizontal well would require 10 acres per pad and that there would be 2 wells per pad. This is much larger than the 2.75 acres calculated for a vertical well. Given the data available this assumption is reasonable. The RFD was revised in 2012 at the request of operators. Part of this process involved data from operators that the BLM could analyze and make a reasonable and science based projection into the future. Without any additional data to reconsider it is impossible to determine whether or not the latest RFD is unreasonable.
Leasable Minerals Fluid	1016-5	Commenters stated that the BLM did not adequately describe the impacts that Greater Sage-Grouse restrictions will have on oil and gas development. Additionally commenters stated that Greater Sage-Grouse mitigation actions were too broad and vague.	The BLM analysis acknowledges Greater Sage-Grouse management effects on fluid mineral development.
Fire and Fuels Management	1017-1	Commenters indicated that the overall analysis of fire and fuels requires explanations that are more descriptive. Specifically, commenters asked that more description be given to issues including benefits of prescribed fires particularly in Greater Sage-Grouse habitat, physical and biological impacts on fuels, Fire Regime Condition Class criteria and trends, impact criteria, and impacts on or due to fuel loading.	The BLM has revised the fire and fuels analysis to provide more clarity and detail. Managing Wyoming big sagebrush stands with prescribed fire would be allowed under any alternative, however these types of treatments would likely be rare due to current and anticipated levels of disturbance from other events and human actions. Additional text was added to further describe fire suppression and ecology, human actions, cheatgrass, grazing, and Fire Regime Condition Class criteria as related to suspected trends of fuels in the planning area.

Issue Category	Summary Number	Summary Comment	Summary Response
Fire and Fuels Management	1017-2	Regarding firefighting, commenters expressed desire for clarification on how cooperation with stakeholders to enhance local fire prevention would occur. Commenters also requested the Preferred Alternative be altered to include more specifics regarding fire management, and expressed concern over the restriction of heavy equipment to fight fires in Greater Sage-Grouse Core Population Areas.	Annual Operating Plans (AOPs) are developed and signed yearly among county, state, and federal firefighting agencies and provide direction for each stakeholder to meet each other's objectives. Fire prevention is an aspect of fire management that aims to decrease ignitions from human activities through public education, outreach, and fire restrictions. Fire prevention activities such as fire restrictions are coordinated among stakeholders. If Alternative D is selected and stakeholders agree to use fire for resource benefit in some parts of the planning area, site specific planning, coordination, and implementation plans would specify details for managing wildfire for resource benefit. Regarding the use of heavy equipment to fight fires in Greater Sage-Grouse Core Population Areas, under Alternative D Fire-3012 explains that protection of Greater Sage-Grouse habitat could include use of heavy equipment if judged to be less damaging than the fire itself.

Issue Category	Summary Number	Summary Comment	Summary Response
Vegetation	1018-1	Commenters requested additional information on how BLM calculated reclamation requirements for coal and fluid mineral development, including grassland and shrubland reclamation acreage requirements. Commenters also requested that BLM specify the total acreage of impacts anticipated to grassland and shrubland communities as a result of mineral development. Commenters were confused by the use of vegetation community descriptions provided by both the Wyoming Game and Fish Department (WGFD) and Natural Resources Conservation Service (NRCS), expressing preference for the NRCS.	The acreages for oil and gas were calculated as follows: CBNG wells projected for each alternative times 2.5 acres of disturbance initially, and 1.5 acres long term. For conventional wells it is two parts. First is horizontal wells. For each alternative it was assumed there would be 2 wells per pad and each pad would be 10 acres initial disturbance and 3 acres long term. For vertical wells it was assumed for each alternative there would be 2.75 acres of initial disturbance and 1.5 acres long term. Coal mines will be reclaimed as areas are mined out and new areas opened. BLM updated the text to include initial and long-term disturbance acreages for grassland and shrubland communities. The WGFD vegetation classification data was used for mapping purposes, so initial descriptions use their terminology. However, it was thought that the NRCS Major Land Resource descriptions added useful information, so both WGFD and NRCS are referenced.

Issue Category	Summary Number	Summary Comment	Summary Response
Vegetation	1018-2	Commenters noted the difficulty in re-establishing native shrublands and expressed concern that native sagebrush shrublands are declining across the planning area. Commenters expressed concern with the discussion regarding seed mixes to be used for reclamation on private land.	BLM believes that the overall trend of grassland and shrubland communities will stay fairly static from this point forward. In the past, there has been a reduction in the sagebrush community, but now reclamation is underway on much of the CBNG development and future authorized surface-disturbing activities will include plans for reclamation; site-specific reclamation actions should reflect the complexity of the project, environmental concerns, and the reclamation potential of the site. BLM acknowledges that the BLM can recommend seed mixes on private surface, but the ultimate mixture is at the discretion of the surface owner.
Vegetation	1018-3	Commenters encouraged the BLM to work with WGFD and private landowners to establish vegetation composition, production and forage utilization transects in the area where WGFD has documented potential habitat degradation resulting from elk numbers.	In order for the BLM to work with WGFD and private landowners to establish vegetation composition, WGFD would need to facilitate their relationship with private landowners. BLM does vegetation monitoring on some grazing allotments that have elk habitat. The BLM will continue to support WGFD's objectives for elk.

Issue Category	Summary Number	Summary Comment	Summary Response
Riparian Wetland	1019-1	Commenters expressed concern over the baseline data used to assess impacts to riparian and wetland areas and whether BLM carried out a baseline assessment of riparian and wetland areas as part of the RMP and EIS. The baseline definition of a wetland was questioned and commenters requested clarification as to why U.S. Fish and Wildlife Service (USFWS) was used as a source and not NRCS. Commenters expressed an interest in partnering with the BLM in developing management actions or baseline inventories on private lands within the Planning Area.	BLM agrees with the concerns presented by commenters regarding the baseline data. An updated baseline inventory is needed. However, at this time funding and other higher priority workloads has not allowed that inventory to be completed. In addition, delineation and marking are implementation activities that will occur with site-specific project proposals. The BLM's definition for "baseline for wetlands" was agreed upon by BLM and all of the cooperators. The USFWS defines wetlands as lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. Wetlands must have one or more of the following three attributes: 1. at least periodically, the land supports predominantly hydrophytes 2. the substrate is predominantly undrained hydric soil, and 3. the substrate is nonsolid is saturated with water or covered by shallow water at some time during the growing season of each year. The NRCS definition has similar three attributes: 1. Predominance of hydric soils, 2. Support hydric vegetation, 3. Usually have ponded water at least 1 to 2 weeks during the growing season. When BLM initiates plans for any new management actions or baseline inventories it will coordinate with adjacent landowners/grazing lessee, local Conservation Districts, and other interested parties.

Issue Category	Summary Number	Summary Comment	Summary Response
Riparian Wetland	1019-2	Commenters also requested additional analysis on the impact assessment, requesting the BLM consider additional information showing significant impacts to riparian and wetland areas resulting from leasable fluid minerals. Another commenter questioned the veracity of the BLM's impact analysis with respect to livestock grazing closures and soil management actions.	The Draft EIS stated that fluid mineral development does have adverse impacts on riparian/wetland vegetation. Parts of the riparian/wetland section have been updated to incorporate discussion of additional impacts addressed in your attached references (Alternative D Mineral Resources). In regards to soil management, *Riparian/Wetland Resources*, Alternative D, Soil section has been updated to a negligible adverse effect. There will be some adverse effects from disturbance of sensitive soils, but disturbance will only occur when there are approved site-specific construction, stabilization, and reclamation plans.
Riparian Wetland	1019-3	The majority of the comments were related to the management actions associated with riparian and wetland areas. Commenters requested clarification about what monitoring and management plans were developed as part of the RMP. Commenters also requested that the BLM consider both larger and smaller setbacks from riparian and wetland areas in different alternatives. Commented requested consideration of additional management actions related to the placement of salt or mineral blocks, watershed monitoring requirements, and limiting range improvements.	BLM has determined that from a multiple use stand point, surface disturbance within 500 feet of riparian/wetlands systems and aquatic habitats can be allowed, as long as it meets resource objectives. Alternative D, the Proposed RMP states "Apply a CSU stipulation to any fluid mineral lease within 500 feet of riparian/wetlands systems, and aquatic habitats." This does not preclude disturbance in riparian/wetland areas. Development can occur; it just needs to be done in a manner that meets the resource objectives.

Issue Category	Summary Number	Summary Comment	Summary Response
Fish and Wildlife	1020-1	Commenters suggested text edits to wildlife-related goals and objectives contained in the RMP. Commenters requested clarification on baseline conditions and data and requested additional documentation of data sources/citations. Other concerns with respect to the Affected Environment included using updated: (1) WGFD wildlife maps, (2) forest ecology studies and existing conditions, (3) big game and sharp-tailed grouse population trends, (4) wildland fire studies and its relationship with wildlife, and (5) road densities/effects of roads on wildlife species. Commenters requested an explanation of how the WGFD determined population objectives for various wildlife species, and requested that BLM define certain terms more clearly.	Goals and objectives were developed through a collaborative process with cooperators. The goals and objectives are broad statements to describe desired outcomes for a specific resource, and should remain general. They do not establish a basis for prioritization of management objectives among different resources. Wildlife management actions in Alternative D were developed with a team of cooperators, including the WGFD, and are designed to meet the obligations of the BLM to uphold federal and state laws and policies, as well as support population objectives set by the WGFD. The information in the RMP in regards to the affected environment and effects analysis for wildlife is accurate and appropriate. In specific instances, the BLM edited the text to clarify terms and included updated population estimates from the WGFD.
Fish and Wildlife	1020-2	Commenters noted the importance of consistent regulations and close coordination with other state and federal wildlife agencies (e.g., USFWS, WGFD). Some commenters were opposed to incorporating USFWS recommendations for spatial and seasonal buffers, favoring management restrictions from the WGFD.	WGFD is an RMP cooperator and was involved in the development of the Preferred Alternative. The current and proposed BLM management are designed to help support WGFD population objectives for big game and Greater Sage-Grouse. If population objectives are not being met, the BLM will use the adaptive management process to address that issue in cooperation with the WGFD. The use of the USFWS seasonal timing limitations are supported by the WGFD, the agency with primary management authority over Wyoming's wildlife.

Issue Category	Summary Number	Summary Comment	Summary Response
Fish and Wildlife	1020-3	A number of commenters questioned the adequacy of the impact assessment for wildlife. Most requested additional citations of the science behind the impact assessment. Commenters noted perceived discrepancies with the analysis of impacts to wildlife resulting from livestock grazing and requested the BLM to remove some language and add citations/justifications for other language in the RMP. Additional impact analysis was requested for top-level predators such as wolves and mountain lions and the impacts to those species resulting from "predator management" actions.	Analysis of each specific species is outside the scope of the RMP. The BLM has edited text to add/correct citations, update information and correct discrepancies for impacts to wildlife, specifically resulting from livestock grazing. The RMP is an allocation plan; predator management is better suited for a programmatic activity plan. BLM cooperates with U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) when there is a need for predator control. The actions typically conducted by APHIS Wildlife Services on public lands are described on page 343 under predatory animals.

Issue Category	Summary Number	Summary Comment	Summary Response
Fish and Wildlife	1020-4	Comments on management actions specific to big game species included requests for less stringent management actions for big game, and requests for tighter restrictions, such as (1) designating crucial habitats for mule deer in addition to elk and (2) using No Surface Occupancy (NSO) within and including 0.5-mile of critical habitat areas instead of relying on timing limitations. Commenters expressed concern with: (1) how the BLM intends to balance big game management with oil and gas development considering its multiple use requirement; (2) the proposed management for big game under Alternative B; (3) the requirement for fluid mineral production and byproducts to be piped out of crucial elk winter range and calving areas; and (4) potential redundancy in restrictions on surface disturbance and CSU and Timing Limitation Stipulations (TLS) within big game areas. Another commenter requested that the BLM consider augmentation of elk populations after CBNG development. Commenters also expressed concern with proposed forest management actions related to big game and other wildlife species. Another commenter suggested that hunting management activities should be modified to help manage big game populations.	The RMP identifies that habitat loss and disruptive activities are assumed to have adverse impacts to wildlife in the context of the RMP impacts analysis. Whether or not big game may habituate to oil and gas activities after a given time would not result in a change to the RMP effects determinations. Site-specific impacts from oil and gas related activities, including potential habituation, will be analyzed at the project level in finer detail. BLM does not propose to restrict oil and gas development in big game habitats other than crucial winter range, calving areas, and migration routes (travel corridors). These elements of big game natural history and habitat use are considered essential to long-term protection of these resources. A map was added to the Final RMP showing migration corridors. The WGFD does not and will not impose timing restrictions on BLM permits. Likewise, BLM does not regulate hunting license numbers, but will forward commenter's hunting recommendations to the WGFD, the agency with primary management authority over Wyoming's wildlife. Restrictions on travel corridors will be evaluated through site-specific analysis. BLM will continue to coordinate with private landowners where protection may be beneficial. Applications of protections for identified travel corridors will be evaluated on a site-specific basis and consistent with other resource values.

Issue Category	Summary Number	Summary Comment	Summary Response
Fish and Wildlife	1020-5	Commenters expressed concern with restrictions on human access to certain portions of the Planning Area during certain times of the year, including provisions for seasonal travel restrictions, travel restrictions within big game priority travel corridors, restrictions within certain buffer distances, and seasonal restrictions that would preclude operations and maintenance activities. Commenters requested removal, modification, and/or clarification of these restrictions. Multiple commenters requested the BLM to revise timing limitations specific to elk populations.	New lease stipulations will not be applied to existing leases. Conditions of approval may be applied to permits issued after the implementation of the final RMP, and will be evaluated on a site-specific basis. The BLM will honor valid existing rights of lease holders in accordance with applicable law. There are currently no "big game" species that have a special designation, BLM-sensitive or otherwise, so the management actions were not changed to include them. Applications of protections for identified travel corridors will be evaluated on a site-specific basis and consistent with other resource values.
Fish and Wildlife	1020-6	Multiple commenters felt that burying powerlines for raptor protection, anti-perching devices on powerlines, seasonal restrictions, and the size of the nest buffers for raptors were unnecessary and not adequately justified. Commenters requested clarification on current nest buffers and seasonal timing restrictions, as well as clarification on how the BLM will implement certain provisions of the restrictions. Some commenters proposed additional restrictions protecting eagles.	Alternative D requires that all above ground powerlines must be part of an approved distribution plan. This requirement would only apply where BLM has authority. A distribution plan is intended to apply in instances where electric utility companies have large-scale projects planned. A distribution plan provides for a community based long-term cost-effective plan for electric distribution versus the current uncoordinated approach which often results in duplicate lines. Dates and distances for buffers were based on recommendations from the appropriate state and federal agencies; the BLM will continue to work with the USFWS and WGFD when issues arise. Appropriate sources were consulted for species ranges and locations.

Issue Category	Summary Number	Summary Comment	Summary Response
Fish and Wildlife	1020-7	Commenters expressed concern for management actions related to fish species, including (1) the 0.25-mile prohibition of development around water bodies, (2) fisheries enhancement design considerations in reservoir design; and (3) requirements to minimize the spread of West Nile virus. Other commenters felt that management actions for fish species placed undue constraints on other resources.	A CSU to 0.25 mile is needed in areas where fish bearing waters are at the bottom of canyons, which is common in the planning area. In these situations the buffer from Onshore Order No. 1 is insufficient to protect the fish habitat from sedimentation since canyon rims are well over 500 feet distance from the water. The CSU does not prevent development within 0.25 mile, and is designed to provide management flexibility. Required design features and best management practices will be considered on a site-specific basis at the project level to identify and incorporate the applicable measures. This provides the opportunity to design reservoirs to meet all objectives such as West Nile Virus (WNv) reduction and safe livestock access. The Required Design Features (RDFs) and Best Management Practice (BMP) lists are not exhaustive, other methods may also be appropriate.
Fish and Wildlife	1020-8	Other comments related to management actions included requests for additional clarification on (1) management requirements on privately owned surface lands, (2) coordination with livestock permittees in vegetation management discussions, (3) costs and responsibilities for BLM's proposed fence management policies benefitting wildlife species; and (4) mitigation for noise impacts.	The BLM will continue to work with permittees on range improvement projects to ensure that they are compatible with resource uses in the area. The BLM will incur the costs for fence modifications that are instigated by BLM. The management actions state that facilities will be placed to mitigate impacts, which could include using topography to help buffer noise. Implementation of the management actions will be evaluated on a site-specific basis and consistent with other resource values.

Issue Category	Summary Number	Summary Comment	Summary Response
Greater Sage-Grouse	1021-1	Commenters requested that BLM consider different scientific papers regarding Greater Sage-Grouse, including some papers that support the State's Greater Sage-Grouse Core Population Area Policy and others that contradict it. Commenters felt that the impact analysis required additional scientific references, clarity, and data to support BLM's conclusions regarding impacts to Greater Sage-Grouse under each alternative. The baseline Greater Sage-Grouse population data and the Garton modeling of Greater Sage-Grouse populations were also called into question. Commenters requested additional work on defining Winter Concentration Areas for Greater Sage-Grouse in the Buffalo Planning Area.	The BLM teams reviewed the suggested references to determine if they were substantially different than the information cited in the Draft RMP and EIS. The additional information did not improve upon the site specific, peer-reviewed studies used in the Draft RMP and EIS; inclusion and consideration would not substantially alter the conclusions or analysis. Therefore, they were not incorporated into the Final EIS. The studies by Walker et al. and Doherty et al. were conducted in the planning area. No peer-reviewed, published data was found to contradict these findings in the Powder River Basin. The BLM incorporated the Conservation Assessment of Greater Sage-Grouse and Sage-Grouse Habitats from the Western Association of Fish and Wildlife Agencies (WAFWA) (2004) into Chapter 3.

Issue Category	Summary Number	Summary Comment	Summary Response
Greater Sage-Grouse	1021-2	Commenters thought that the BLM should adopt stricter protection standards for Greater Sage-Grouse, including recommendations developed by the National Technical Team (NTT), while other commenters favored less restrictive policies towards Greater Sage-Grouse protection. Many commenters expressed concern with the BLM's policies in non-Core Population Areas, seasonal buffer distances and access restrictions, wintering areas, development density, livestock restrictions, fence design requirements, fire management, required design features, and noise buffers. A Greater Sage-Grouse-specific ACEC was requested for consideration and/or adoption in the Final RMP, as well as additional consideration for the area to support genetic linkages with other Greater Sage-Grouse populations. Provisions from other Wyoming BLM RMPs were offered for consideration in the Buffalo RMP. Other commenters felt that Alternative D should be more consistent with the State's Greater Sage-Grouse Core Population Area Policy. Existing lease holders expressed concern with how Greater Sage-Grouse protections might affect their operations. Commenters also questioned the powerline avoidance theory and BLM's requirement to bury powerlines. Other commenters doubted that WNvs could have serious impacts to Greater Sage-Grouse and provided additional citations. Many commenters requested clarification on a number of the proposed protection measures for Greater Sage-Grouse.	The Required Design Features in the RMP are from BLM's Greater Sage-Grouse National Technical Team. To provide BLM-wide consistency the recommendations cannot be revised. However, during implementation the site-specific situation shall be considered including effectiveness of the design feature as well as technical and economic feasibility. In a few instances, BLM has modified/clarified text for design features referenced by commenters. In addition, citations were added/corrected to reference applicable laws and regulations. The sagebrush ACEC is not part of the Proposed RMP. BLM's Proposed RMP is consistent with the Wyoming Governor's Executive Order (EO) 2011-5 that has been determined sufficient to conserve Greater Sage-Grouse throughout Wyoming and WAFWA Management Zone I. As a multiple use agency, the BLM considered the protection of Greater Sage-Grouse lekking, nesting and brood-rearing habitats as well as the potential for oil and gas mineral recovery. BLM's proposed RMP is the least restrictive management that effectively accomplishes resource objectives and therefore complies with the Energy Policy and Conservation Act. To be consistent with the Governor's Greater Sage-Grouse Core Population Area Strategy, appropriate restrictions were removed from Alternative D.

Issue Category	Summary Number	Summary Comment	Summary Response
Greater Sage-Grouse	1021-3	Commenters felt that the BLM should implement a compensatory mitigation program as part of their overall Greater Sage-Grouse conservation planning. Others felt that the use of cooperative agreements (e.g., candidate conservation agreements) with private landowners was the best strategy for conservation of Greater Sage-Grouse. One commenter noted the importance of incorporating adaptive management provisions into the Final RMP. Commenters also requested consistent reclamation criteria regarding Greater Sage-Grouse habitat be adopted across all BLM offices.	Compensatory mitigation will be considered on a project specific basis in accordance with BLM policy. BLM is developing a statewide monitoring and adaptive management strategy in cooperation with the State of Wyoming which will be included in the Proposed Plan and Final EIS. Regarding reclamation criteria, this Planning Area, specifically, must rely heavily on Greater Sage-Grouse habitat restoration and provides this requirement as an imposition on federal surface only as a condition where it qualifies. It is not consistent with EO 2011-5, but has been agreed to by the cooperators of this plan, including the Governor's office.

Issue Category	Summary Number	Summary Comment	Summary Response
Special Status Species	1022-1	Regarding special status species management, commenters requested more definition, objectivity, consistency, and updated references be added to support data in these sections in the Buffalo RMP and EIS. Commenters questioned specific data and conclusions, either supporting more or less restrictions surrounding special status species habitat and nesting or roosting sites, often suggesting language edits. Commenters urged the BLM to maintain compliance with statewide programmatic documents, regional planning documents, recommendations from the USFWS, and prior agreements between developers and the USFWS. Some commenters suggested including more birds in the *Special Status Species – Wildlife* section for analysis, while other commenters suggested eliminating certain birds from analysis. Commenters suggested expanding discussion of factors contributing to black-tailed prairie dog habitat and health impacts, as well as increasing monitoring and surveying of black-tailed prairie dogs and burrowing owls. However, other commenters request that language be added to state that BLM cannot authorize surveyors to traverse private lands. Some commenters were concerned that restrictions to oil and gas and utility line development due to habitat protections were overly adverse and inconsistent with Wyoming Executive Order 2011-5. Commenters cautioned the BLM from endorsement or approval of any particular products, for example specific anti-perch devices, due to potential liabilities.	The BLM updated the text to include more recent information regarding special status species where appropriate. The analysis of special status species is reasonable. Analysis of each specific species is outside the scope of the RMP. The purpose of the RMP is to inform the reader what larger habitat types occur in the resource area, along with their relative abundance, and how those habitat types and wildlife may be impacted by other resource allocations (not specific actions). Since many species utilize the same general habitat type in the Buffalo planning area, effects from habitat loss can be assumed to be similar. Site-specific analysis of proposed projects will address the impacts on a finer scale. The BLM is required to assess impacts to special status species from all federal actions, including those on federal mineral estate. Surveys on private land will be coordinated with landowners. The BLM does not authorize trespass on private lands. The BLM has and will continue to incorporate recommendations from large-scale regional plans and assessments as they become available.

Issue Category	Summary Number	Summary Comment	Summary Response
Cultural Resources	1023-1	Commenters wanted BLM to provide more detail in the cultural resources analysis, specifically regarding NSO and CSU stipulations, visual resource management, and the designation of certain areas as Traditional Cultural Properties (TCPs) and ACECs and not others. Many commenters specifically requested more information as to the reasons why the Preferred Alternative designates Pumpkin Buttes as an ACEC, and how Visual Resource Management (VRM) restrictions and NSO and CSU stipulations would affect existing and future leases in this area. Several commenters also expressed concern that the VRM restrictions and NSO and CSU stipulations around cultural sites were too restrictive. Multiple commenters stated that in the RMP the BLM should acknowledge that oil and gas development often leads to significant additional information about cultural sites due to policies requiring site analysis before development is approved. Commenters requested additional explanation regarding Cultural Resource Project Plans (CRPPs), the National Historic Preservation Act (NHPA) process, and National Historic Trails designations, and were concerned that some data and existing Cultural Resource Management Plans (CRMPs) could be outdated or incorrect. Commenters recommended expanding discussions of historic and cultural resources to include evaluation of the historic landscapes located within the project area.	The BLM has amended the cultural resources analysis in the RMP for clarity and additional description, adding detail regarding NSO and CSU stipulations, visual setting management for historic trails and other cultural sites, and added language to Appendix S (p. 2531) which details all ACEC designations. Additional text has been added to Chapter 3 describing existing conditions and agreements that address the Pumpkin Buttes TCP. Regarding the Pumpkin Buttes ACEC designation, the visual setting or viewshed was a consideration during nomination. BLM discussed the setting of the Pumpkin Buttes during consultations with numerous tribal representatives prior to the determination that it is a TCP in 2006. It was determined that the setting of the TCP had been impacted by recent development, but overall the site retained its setting. The width of the CSU to be applied to historic properties was discussed at length during the cooperators meetings. The three mile distance to consider impacts to the setting of certain historic properties was decided upon based on Wyoming State History Preservation Office's (SHPO')s experience with historic trails issues in other parts of Wyoming. The distance is not arbitrary since it is consistent with other Wyoming BLM plans. The RMP discloses that NSO and CSU stipulations associated with this RMP cannot be applied to existing leases. Exceptions for the NSO and CSU stipulations are described in Appendix H (p. 1959). Text has been added to Chapters 3 and 4 clarifying these issues.

Issue Category	Summary Number	Summary Comment	Summary Response
			The text of Chapter 3 of the RMP has been revised to acknowledge the information gained by inventories in relation to NHPA compliance. However, it is inaccurate to assume that heightened development provides for more data recovery or excavation. Cultural resources survey for the purpose of complying with NHPA Section 106 identifies archeological sites, but does not necessarily lead to advancement of archeological knowledge. Variable recordation techniques, limitations of regulation, private surface owner concerns, and other issues hinder pure scientific investigations. Text in Chapter 3 of the RMP has been revised to clarify the difference between CRPPs and CRMPs and to identify the need for CRPP development. The development of CRPPs is intended to define areas that have more significance than others within the region and can result in a reduction of the geographic scope of the plan. Cultural-5005 will prompt BFO to write new CRPPs for certain sites with all interested stakeholders. The BLM has acknowledged comments calling for evaluation of properties as historic landscapes and has added text to Chapter 3 discussing rural landscapes.
Paleontological Resources	1024-1	Commenters expressed concern about the NSO stipulation on areas containing paleontological resources of high quality or importance under Alternative D and suggested other avoidance measures could be put in place that would protect the resource without the severity of limitations to mineral development associated with an NSO. Commenters also requested that BLM clarify what qualifies as “high quality or importance” in regards to paleontological resources.	BLM should have the flexibility to apply an NSO when appropriate to specific areas contacting known scientifically significant paleontological resources. As such, an alternative should be present which allows this. Currently, the BLM Washington Office is working on establishing criteria for scientifically significant paleontological resources.

Issue Category	Summary Number	Summary Comment	Summary Response
Visual Resources	1025-1	Commenters expressed concern that VRM in the RMP needs to consider existing leasing, ongoing oil and gas leasing, and valid existing rights. Commenters requested that the BLM make its new VRM class designations consistent with its prior leasing decisions.	The BLM will honor the valid existing rights in the planning area as identified in the *Planning Criteria* section of Chapter 1. No objectives associated with VRM preclude or prohibit development or management activities. Rather, the VRM class objectives must be met when development occurs, if at all possible, using design features and topography of the landscape, and the objectives serve to encourage the use of mitigation techniques to reduce the impacts to visual quality. Development and disturbance can occur in all VRM Class areas as long as the objectives of the respective class are met.
Visual Resources	1025-2	Commenters stated that BLM clarify that VRM classes do not apply to State of Wyoming and private lands and the analysis should reflect this. Commenters also stated that VRM classes should not be applied to oil rigs because they are a temporary disturbance.	The Buffalo RMP does not assign VRM classes to non-BLM-administered surface and the *Affected Environment* and *Environmental Consequences* sections have been amended for clarity. The BFO RMP defines temporary structures as those present on BLM-administered lands for less than 90 days. The RMP notes that such facilities are not subject to visual effects mitigation. Structures remaining on BLM-administered lands longer than 90 days may be subject to additional VRM mitigation.

Issue Category	Summary Number	Summary Comment	Summary Response
Visual Resources	1025-3	Commenters requested clarification of, additional language, and changes to VRM classes, including Pumpkin Buttes and WSAs. Commenters offered additional areas to be considered for VRM class designations. Commenters generally stated that Alternative D is unnecessarily restrictive.	The visual resources inventory did incorporate the entire visual landscape, including aesthetic resources and impacts on adjacent private lands into the analysis; however, the BLM only assigns Visual Resource Inventory (VRI) and VRM classes to BLM-administered surface. The visual resources inventory and analysis uses the boundaries for the Pumpkin Buttes Traditional Cultural Property to implement the management prescriptions for visual resources. The Buffalo RMP does not assign VRM Classes to non-BLM-administered surface and the Affected Environment and Environmental Consequences sections have been amended for clarity. The maps in the RMP are generalized maps due to the scale of mapping required for an area the size of the planning area. As a result, some maps, e.g., Map 51, have been amended. The Federal Land Policy and Management Act of 1976, 43 United States Code (U.S.C.) 1701 et. seq. in (1) Section 102 (a)(8). States that "...the public lands be managed in a manner that will protect the quality of the...scenic...values...." and (2) Section 103 (c). Identifies "scenic values" as one of the resources for which public land should be managed. Alternatives B and D represent two alternatives within a reasonable range.

Issue Category	Summary Number	Summary Comment	Summary Response
Lands and Realty	1026-1	Commenters requested more detail be given regarding how the BLM is planning to address split estate lands. Furthermore, commenters suggested BLM exchange lands, but with the result of no net acreage gain, in areas with mixed ownership resulting in more contiguous federal land ownership patterns for the benefit of management and priority resources, the ability to better manage the State's surface and mineral estate, and the capability to maintain access to State trust lands. Commenters identified specific parcels for potential exchange and recommended adopting management actions from other RMPs.	Split estate is discussed briefly within the land ownership (see the *Land Ownership within the Planning Area* section of Chapter 1), planning criteria (see the *Planning Criteria* section of Chapter 1), and under applicable resource sections. BLM also maintains a split estate website (http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/split_estate.html) that can be referenced for additional information. BLM will work with the Office of State Lands and Investment during RMP implementation. The management actions were created with the assistance of cooperating agencies including the State of Wyoming. BLM has worked with and will continue to work with the State of Wyoming to exchange State lands.
Lands and Realty	1026-2	Commenters recommended that acquisition priorities should emphasize lands with high habitat value or recreation potential. Commenters also recommended the BLM avoid disposing of federal lands that could fragment habitat blocks and connectivity corridors, as well as consolidate ownership of lands with sensitive habitat for Greater Sage-Grouse and other priority species.	The Buffalo Field Office's management actions L&R-6011 and L&R-6012 address acquiring lands with high habitat values (consistent with resource objectives, based on all resource values, presence of sensitive species). Lands identified for disposal are small, isolated parcels. BLM's main objective is to consolidate lands with larger blocks of BLM-administered surface.
Lands and Realty	1026-3	Commenters expressed concern that the BLM's goals for lands and realty management are too narrow for adequately managing forest products.	The RMP goals were created with the assistance of cooperating agencies. BLM and cooperators, including the Wyoming Department of Agriculture and the counties have determined that the goals are sufficient for managing forest products.

Issue Category	Summary Number	Summary Comment	Summary Response
Renewable Energy	1027-1	Commenters urged the BLM to recognize the value of wind energy to the American public and reconsider how some of the adverse impacts to wind energy are characterized. Commenters recommended ways impacts from wind energy could be mitigated to lessen visual impacts and reduce surface disturbance and suggested not all viewers considered wind turbines a blemish on the landscape.	BLM does consider wind to be a valuable energy source; however, BLM is also responsible for disclosing the environmental effects, beneficial and averse, of proposed actions. All ROW applications including wind energy will be reviewed on a case-by-case basis, to balance protection of resources with America's wind energy needs. Environmental impacts often affect a larger area than the physical foot print of the project for example soil erosion and stream sedimentation, wildlife displacement from and avoidance of infrastructure, emissions during construction, etc.

Issue Category	Summary Number	Summary Comment	Summary Response
Right-Of-Way and Corridors	1028-1	Some commenters were concerned that the proposed ROW corridors would be inconsistent with BLM's multiple-use land management obligations as well as limit the ability of oil and gas operators to sufficiently transport their products. Commenters were also concerned that the criteria and standards for evaluating proposals in avoidance areas were overly restrictive and inflexible. Multiple commenters requested the BLM provide maps for potential ROW exclusion and avoidance areas, correct the overlap of avoidance and exclusion areas with designated ROW corridors under all alternatives, and specify that ROW corridors take precedence over avoidance and exclusion areas. Commenters also expressed concern regarding the placement and locations of above and below-ground utility corridors. Some commenters sought specific information about the proposed ROW programs under each alternative including the width of designated corridors, the requirements for co-location of projects, justification for the proposed avoidance and exclusion areas, management regarding buffer zones around active raptor nests within ROWs, and reclamation management within ROWs.	No ROW width limits will be applied with the current management action ROW-6004. BLM will consider adequate separation, safety, and appropriate federal, state and local statutes, regulations and policies, and land use constraints on each ROW application. In areas open to such uses, BLM will analyze each ROW application on a case-by-case basis and determine the best management action based on resources identified in the location of the proposed application to prevent undue or unnecessary degradation to the lands. BLM updated the text under the Methods and Assumptions area of Rights-of-Way and Corridors to help define avoidance versus exclusion areas. BLM created a new map for Alternative D showing the ROW exclusion and avoidance areas. Valid and existing lease rights will be honored as identified in the planning criteria.
Travel and Transportation Management	1029-1	Commenters generally expressed opposition to the restrictions on motorized vehicle use within Big Game Crucial Winter Range under alternatives B and D and requested additional analysis. Commenters requested that the BLM analyze the impacts to oil and gas development from these restrictions, including the impacts on the local economy.	During the alternative development process, cooperating agencies supported a Preferred Alternative that limits travel to designated routes for members of the general public. The land tenure, public access issues and mineral development levels coupled with defined resource management objectives for recreation, wildlife and cultural resources make locating an appropriate area for open off-highway vehicle (OHV) use difficult in the Buffalo Field Office. BLM has amended text to clarify Travel and Transportation Management Actions and their application to fluid mineral development.

Issue Category	Summary Number	Summary Comment	Summary Response
Travel and Transportation Management	1029-2	Commenters requested that the BLM update its Motor Vehicle Use map, and work with local OHV stakeholders and recreationists before any decision regarding motorized travel areas. Commenters offered revisions to design features in Appendix D (p. 1863) that were associated with roads.	BLM has amended text for clarity. Site specific management plans for travel management will determine the most appropriate method for implementing, monitoring and enforcement. Various methods, including signage, gates, education, and law enforcement may be employed depending on a given situation. The land tenure in the Buffalo Field Office makes travel management a particularly challenging issue. Stakeholders will have an opportunity to be involved with travel management planning where BLM would consider nominations from the public for appropriate OHV use areas, consistent with other resource values.
Travel and Transportation Management	1029-3	Commenters stated that the BLM needs to ensure they have adequate budget and staffing to pursue inventories and closures, including habitat reclamation.	Generally, travel management planning is subject to funding availability and the timeline will depend heavily on whether or not travel management plans and reclamation efforts are funded by Congress. The Goals and Objectives for Travel and Transportation Management in the Buffalo Field Office would base road or trail closures and abandonments on desired road or trail densities, demands for new roads, resource protection, and existing uses. Unless otherwise authorized, BLM would close and reclaim roads and trails if they are heavily eroded, washed out, or if other access roads in better condition are available.
Travel and Transportation Management	1029-4	Commenters were concerned with the BLM's aggressive timeline for developing a travel management plan.	The five year timeline is prescribed in Manual 1626 – Travel and Transportation. The BLM will make every effort to meet national policy and guidance. Generally, travel management planning is subject to funding availability and the timeline will depend heavily on whether or not travel management plans are adequately funded.

Issue Category	Summary Number	Summary Comment	Summary Response
Recreation	1030-1	Commenters requested more description and consistency be given to recreation management in the Buffalo RMP and EIS. Commenters called for more detailed explanation regarding justification for closure areas, and how Special Recreation Management Areas (SRMAs) would impact oil and gas operations. Commenters recommended that information from Appendix T (p. 2543), be incorporated into the management actions in the RMP, and suggested specific wording edits to improve consistency and clarity.	BLM has edited management actions for consistency and clarity and revised text where appropriate, specifically regarding Appendix T (p. 2543). BLM has not edited text for management actions where BLM has no jurisdiction in the matter. Page 719 of the Draft RMP describes the effects of SRMAs on oil and gas development. An MOU Roundtable will be added as an interested party to site-specific management plans prior to any final decision to initiate a temporary or permanent closure.
Recreation	1030-2	Commenters provided suggestions for management of certain areas, particularity Welch Ranch, including trail development, land acquisition, motorized travel limitations, and hunting restrictions. Various commenters expressed concern over management they deemed too restrictive towards recreational shooting, while others considered recreational shooting management not restrictive enough. Commenters encouraged the BLM to prioritize increased and improved signage and recreationist safety measures, and to provide information from updated sources, especially concerning visitor use levels and economic benefits due to SRMAs.	As a broad-reaching document, the scope of the BFO RMP is generally narrowed to land use allocations and relies on references to previous public documents. The summarized analysis of impacts to recreation from recreational shooting closures in Alternative B states, "All SRMAs would be closed to recreational shooting, which would reduce noise, user conflicts between shooters and other recreationists, and would improve safety in areas without proper backdrops. Because the SRMAs and other developed recreational facilities are often the most easily accessible lands within the planning area, there would likely be a substantial reduction in opportunities for target shooting on BLM-administered lands. However, target shooting opportunities are readily available on other public lands in the planning area and at several private shooting ranges." The BLM maintains that the analysis of the issue is appropriate for the land use planning; however, the BLM anticipates forming a team with members of the roundtable to assist in the development of alternatives to manage target shooting in Weston Hills.

Issue Category	Summary Number	Summary Comment	Summary Response
Lands with Wilderness Characteristics	1031-1	Commenters questioned the BLM's identification of only one inventory unit possessing Wilderness Characteristics and requested review of the BLM field inventory data sheets. Commenters asked the BLM to provide additional information and/or explanation regarding the wilderness characteristics inventory. Commenters provided supporting information for lands with wilderness characteristics. Commenters asserted the BLM inventory was inadequate and should be reassessed following BLM Manuals 6310 and 6320. Other commenters suggested the lands with wilderness characteristics unit should be expanded under Alternative D.	BLM inventoried the entire planning area for lands with wilderness characteristics in accordance with BLM Manuals 6310 and 6320 and documented that only one unit met the requirements for size, naturalness and outstanding opportunities for solitude or primitive and unconfined recreation. The inventory worksheets have been added to the BLM website (http://www.blm.gov/wy/st/en/programs/Planning/rmps/buffalo/docs.html). BLM will review new information on an ongoing basis. BLM has determined that the parcel proposed under Alternative D is appropriate.

Issue Category	Summary Number	Summary Comment	Summary Response
Lands with Wilderness Characteristics	1031-2	Commenters challenged the BLM's determination that three areas in the Citizens' Wilderness Proposal (Gardner Mountain, North Fork Powder River, Fortification Creek) do not contain wilderness characteristics, suggested the BLM reconsider these areas, and provided supporting information for the BLM to consider. Commenters indicated that conditions had changed in the western sub-unit of Fortification Creek and that supplemental analysis was needed for this area. Other commenters stated that the 2010 inventory of lands with wilderness characteristics was inconsistent with the 2012 BLM Manual 6310 and that a new inventory was necessary. One commenter asked the BLM if a trespass cabin in the Fortification Creek area had been removed or not.	BLM analyzed and produced inventory reports on several areas in the Buffalo Field Office, including Fortification Creek and the BLM determined that the area did not meet the criteria set forth in Manual 6310- Conducting Wilderness Characteristics Inventories on BLM Lands. BLM would consider any new information regarding wilderness characteristics in this area. Lands with wilderness characteristics inventories are public documents. BLM inventoried the lands with wilderness characteristics unit (locally referred to as the Face of the Bighorns) and documented that the unit met the requirements for size, naturalness and outstanding opportunities for solitude or primitive and unconfined recreation. The inventory worksheets have been added to the BLM website (http://www.blm.gov/wy/st/en/programs/Planning/rmps/buffalo/docs.html). The trespass cabin was removed in 2011 and full reclamation of the site has been completed. The unauthorized development was not considered in the assessment of the naturalness of the unit.

Issue Category	Summary Number	Summary Comment	Summary Response
Lands with Wilderness Characteristics	1031-3	Commenters suggested the 1979 inventory of potential lands with wilderness characteristics and Wilderness Study Areas (WSAs) was inadequate, outdated, and did not account for expanding energy development, resulting in a violation of BLM's Information Quality Guidelines of 2012. Commenters opposed closing lands with wilderness characteristics to mineral development, requesting that management allow for the flexibility to analyze development proposals on a project-specific basis. Commenters suggested that with modern reclamation, oil and gas development and production was not in conflict with wilderness protection and imposing additional management to protect these areas was not necessary.	BLM's initial inventories for lands potentially containing wilderness characteristics in the planning area were completed in 1978 and 1979. BLM updated inventories for lands potentially meeting the size and naturalness criteria according to the policy set forth in Manual 6310- Conducting Wilderness Characteristics Inventories on BLM Lands (currently in effect) between 2010 and 2012. FLPMA requires BLM to keep a current inventory of resources on public lands, including wilderness characteristics and will update these inventories periodically when new information is available. The purpose of the RMP, as explained in the *Purpose and Need for the Resource Management Plan Revision* section of Chapter 1, is to provide direction for managing public lands in accordance with BLM's multiple use mandate. Recognizing the Nation's need for domestic sources of minerals, food, timber, and fiber, and incorporating the requirements of the Energy Policy Act of 2005 (Pub. L. 2005) balanced with conservation of wildlife habitat, recreational opportunities and wilderness values are examples of the multiple uses BLM accommodates. The BLM developed and analyzed alternatives in the Proposed RMP and Final EIS using the best available information in compliance with federal laws, guidelines, and policies.

Issue Category	Summary Number	Summary Comment	Summary Response
Livestock Grazing Management	1032-1	Commenters expressed concern regarding the lack of disclosure of direct impacts to livestock grazing. Specifically, commenters requested a more detailed description for each alternative of the direct impacts that would result from changing Animal Unit Month (AUM) allocations in the Planning Area.	The BLM developed and analyzed alternatives in the Proposed RMP and Final EIS using the best available information in compliance with federal laws, guidelines, and policies. The BLM analyzed specific terms and conditions for each allotment developed during the grazing lease renewal analysis. The terms and conditions would depend on the specific allotment characteristics including if the allotment was meeting Rangeland Health Standards. The BLM provided clarifying text regarding livestock grazing where appropriate.

Issue Category	Summary Number	Summary Comment	Summary Response
Livestock Grazing Management	1032-2	Commenters requested that the BLM incorporate additional text to better address livestock grazing management, particularly related to the BLM's proposed management of potential conflicts between livestock grazing and other resources and uses. Specifically, commenters requested more discussion on the impacts of livestock grazing on special status species and wildlife; changes to vegetation as a result of livestock grazing; policies and specific management actions or changes to current management to guide livestock grazing activities in identified Greater Sage-Grouse seasonal habitats; and reserve common allotments.	Upon review conducted by BLM, there is no evidence that current stocking rates have impacted endangered, special status, and sensitive species. 97% of grazing allotments assessed to date meet the Wyoming Standards for Healthy Rangelands. The effects of livestock grazing on threatened, endangered, special status, and sensitive species are analyzed in detail in the grazing lease renewal Environmental Assessments (EAs) using site specific allotment data (such as presence of bald eagle nests and Greater Sage-Grouse leks). As stated in the Draft RMP and EIS, Special Status Species – Wildlife, livestock grazing management will have a major beneficial effect on special status wildlife species, including Great Sage-Grouse because of several actions to adjust livestock grazing management to achieve multiple resource health and objectives. These actions include seasonal rotations and appropriate stocking rates. The purpose of BMPs is not to select certain practices or designs and require that only those be used. It is not possible to evaluate all the known practices and make determinations as to which are best. BMPs should be matched and adapted to meet the site-specific requirements of the management action, project and local environment.

Issue Category	Summary Number	Summary Comment	Summary Response
Livestock Grazing Management	1032-3	Commenters suggested revisions to the goals and management actions, requested clarification that livestock grazing is not a surface-disturbing activity, suggested terms and conditions for livestock grazing management, and indicated two additional alternatives to analyze. Some commenters expressed concern that the impacts were overstated, while other commenters stated the document did not address all the impacts.	The RMP analyzes management actions at the planning area scale. Impacts to specific sites will be analyzed during implementation level projects. A surface-disturbing activity is an action that alters the vegetation, surface/near surface soil resources, and/or surface geologic features, beyond natural site conditions and on a scale that affects other Public Land values. Livestock grazing management done in accordance with Alternative D, following the Standards for Healthy Rangeland, would not meet the definition of a surface-disturbing activity.

Issue Category	Summary Number	Summary Comment	Summary Response
Areas of Critical Environmental Concern	1033-1	Commenters questioned if the proposed ACECs meet the relevance and importance criteria and requested additional documentation to support the designations. Commenters cited specific research supporting their position that the areas did or did not need special management. Commenters stated the information in Appendix S (p. 2531) should be included in Chapter 2.	According to the BLM ACEC Manual 1613: Designation [of ACECs] is based on whether or not a potential ACEC requires special management attention in the selected plan alternative. "Special management attention" refers to management prescriptions developed during preparation of an RMP or amendment expressly to protect the important and relevant values of an area from the potential effects of actions permitted by the RMP. These are management measures which would not be necessary and prescribed if the critical [relevant] and important features were not present. Special management attention also includes any plan provision intended to protect life and safety from natural hazards. Initial determinations for several ACECs were documented in Appendix R of the Powder River Basin Final EIS (BLM 2003). Other areas were analyzed due to agency requirements for newly acquired lands or for protection of sensitive resources. All areas analyzed within the RMP were determined to possess relevant and important values. Appendix S (p. 2531) identifies the relevant and important values for the areas analyzed and provides documentation to support the BLM's ACEC decisions. The BLM reviewed the ACEC designations for Alternative D and determined the Fortification Creek ACEC would not be carried forward into the Proposed RMP as the RMP Amendment management prescriptions carried forward in the RMP have been determined sufficient to protect the relevant and important values.

Issue Category	Summary Number	Summary Comment	Summary Response
			Regarding valid existing rights, the *Leasable Minerals - Fluids* section in Chapter 3 clarifies that, "the actions in [the RMP] are subject to valid existing rights." Leases are an existing contract between the lessee and the federal government and the stipulations as part of that cannot be changed unless an exception, modification, or waiver of the lease stipulation occurs. The BLM noted recommendations to include information from Appendix S (p. 2531) in Chapter 2, and edited the RMP accordingly.
Areas of Critical Environmental Concern	1033-2	Commenters requested more information as to why Pumpkin Buttes should be an ACEC in addition to its current TCP designation. Commenters stated that the RMP fails to adequately describe the current conditions of Pumpkin Buttes or clearly explain how the ACEC will affect the current and proposed development and existing rights.	Pumpkin Buttes ACEC was originally inventoried during the Powder River Basin Final EIS (BLM 2003c). Subsequent tribal consultation documents that the area meets the relevance criteria standard according to the Federal Land Policy and Management Act of 1976 for ACEC designation due to its rare and sensitive archeological remains as well as the site's significance to several native American tribes. A management plan would be created for the ACEC in consultation with all stakeholders which will acknowledge the valid existing rights associated with ROW holders, fluid mineral lessees, and locatable mineral claimants and explore potential mitigation for any proposed surface disturbances. Further, no objectives associated with ACEC designation would preclude or prohibit development or management activities. Text has been added to the RMP related to the current conditions of Pumpkin Buttes to better address the rationale for, and effects of, this proposed ACEC designation.

Issue Category	Summary Number	Summary Comment	Summary Response
Areas of Critical Environmental Concern	1033-3	Some commenters supported the Fortification Creek ACEC and requested it include additional acreage, while other commenters indicated ACEC designation of this area was not warranted. Some commenters requested designating other ACECs identified in Alternative B.	Fortification Creek was determined to meet the relevance and importance criteria in the 2003 PRB Final EIS and when re-evaluated for the RMP revision. The Draft EIS (pg. 449) and Fortification Creek RMP Amendment Decision Record identified that the citizen proposed boundary did not adequately represent the resources for which the ACEC was nominated. To better represent the relevant and important resource values, the boundary evaluated in the RMP revision is the BLM-administered lands within the crucial seasonal ranges (calving areas and crucial winter range). The sagebrush ACEC which was analyzed in Alternative B is much larger than the Core Population Areas and Connectivity Corridors that have been determined sufficient to conserve Greater Sage-Grouse throughout Wyoming and WAFWA Management Zone I. Neither the Fortification Creek nor Sagebrush Ecosystem ACEC are carried forward in the proposed alternative as the proposed management was determined sufficient to protect the important and relevant values for each area.

Issue Category	Summary Number	Summary Comment	Summary Response
Scenic or National Back Country Byways	1034-1	Commenters expressed concern that designation of the Slip and Hazelton Roads as National Back Country or Scenic Byways would increase traffic and graffiti, litter, and unauthorized off-road travel along the roads. Other commenters suggested the roads are not maintained year-round or to a level that is sufficient for increased traffic, potentially affecting the safety of travelers and increasing county maintenance requirements and costs. Another commenter indicated that while designation of some roads was appropriate, it was not practical due to the lack of federal funding unless supported by counties responsible for maintaining the roads.	The decision to designate any road as a back country byway will occur separate from the RMP process, requiring subsequent analysis and input from counties and other stakeholders before designation.
Wild and Scenic Rivers	1035-1	Commenters recommended the BLM reconsider five waterways for inclusion in the National Wild and Scenic River (WSR) System, including Red Fork Powder River, Beartrap Creek, North Fork Powder River, Pass Creek, and Poison Creek.	The BLM evaluated all waterways in the planning area, including those listed, for designation as a WSR (see the *WSR* section in Chapter 3). Beartrap Creek and North Fork Powder River were found eligible, but they did not meet the suitability criteria for designation in BLM Manual 6400 - Wild and Scenic Rivers. The remaining three waterways did not meet the eligibility criteria for designation.
Wilderness Study Area	1036-1	Commenters expressed concern that designation of WSAs would invite public impacts. Commenters recommended expanding the Gardner Mountain WSA.	WSAs are special designations pending before Congress; BLM is required by law to manage WSAs so as not to impair their suitability for preservation by Congress as Wilderness. The BLM is precluded from amending the acreage of an existing WSA and from designating any new WSAs. The BLM conducted an inventory of additional lands outside of all three WSAs in the Buffalo Field Office and determined that additional lands with wilderness characteristics adjacent to WSAs are not present. The commenter is urged to contact Congressional representatives regarding Wilderness Study Area designations and management.

Issue Category	Summary Number	Summary Comment	Summary Response
Wilderness Study Area	1036-2	Commenters requested the BLM incorporate an additional goal and management actions supporting local and state government review processes to remove existing WSAs from land use restrictions. Commenters suggested revisions for management of WSAs related to mineral development and after congressional release of WSAs to maintain wilderness characteristics until a land use plan amendment is completed.	BLM added language, "If Congress decides not to designate a WSA as wilderness, do not lease mineral rights until a plan amendment is completed. Additionally, motorized travel, surface-disturbing activities and any other activities (except valid existing rights) that may impair the wilderness resource will be prohibited until a plan amendment is completed. WSAs released from Congressional designation would then be subject to consideration as Lands with Wilderness Characteristics."
Wilderness Study Area	1036-3	Commenters questioned if the three WSAs exhibit wilderness characteristics due to information that the WSAs contain considerable road systems. In addition, commenters indicated reevaluation of the Fortification Creek WSA was appropriate because the ecological importance of the area for vegetation and elk was overstated.	WSAs are special designations pending before Congress; BLM is required by law to manage WSAs so as not to impair their suitability for preservation by Congress as Wilderness. The BLM is precluded from amending the acreage of an existing WSA and from designating any new WSAs. The BLM conducted an inventory of additional lands outside of all three WSAs in the Buffalo Field Office and determined that additional lands with wilderness characteristics adjacent to WSAs are not present. Rarity of ecosystem does not affect whether or not the unit is designated as a WSA.

Issue Category	Summary Number	Summary Comment	Summary Response
Social and Economic	1037-1	Commenters questioned the adequacy of the analysis of social and economic impacts, and expressed concern about the impact of BLM management on local and regional economies. In particular, commenters indicated that decisions restricting mineral development had not been adequately analyzed or justified in terms of their social and economic impacts including due to (1) large closures and application of major constraints to oil and gas leasing, (2) prioritizing coal over oil and gas, (3) seasonal timing restrictions, (4) travel management restrictions, and (5) designation of special management areas (e.g., SRMAs, ACECs). Additional analysis was also requested related to boom/bust cycles, locatable mineral withdrawals, and impacts on local jobs.	The BLM has added discussions of qualitative impacts on quality of life, conflicts over multiple use, and seasonal restrictions. Potential mitigation actions have been included where possible. To address concerns related to mineral development: 1. BLM has added discussion of the potential impacts of future restrictions on current leases. 2. BLM has modified the proposed alternative, to clarify how coal and fluid minerals are to work together. 3. BLM has added language to expand on the discussion of the impacts of seasonal closures. 4. BLM has added language to clarify impacts to SRMAs. BLM clarified that past boom and bust cycles and the vulnerability of the planning area to these cycles are briefly discussed in several sections of Chapter 3 (e.g., see pages 460 and 477). Chapter 4, p. 1461 recognizes the possibility of the boom and bust cycle type effects in the planning horizon but notes that the pace of development during the planning horizon is currently unknown. Therefore, it is not possible to presently determine whether a new boom and bust cycle will occur in the planning horizon, nor the extent of impacts of this cycle should one occur.

Issue Category	Summary Number	Summary Comment	Summary Response
Social and Economic	1037-2	Commenters made recommendations on the organization of the socioeconomic sections, sources to reference, additional baseline data collection, and monitoring. Specifically, commenters requested that the BLM describe the geographic distribution of communities and transportation infrastructure, identify different social groups and organizations in the planning area, include information on trends, and identify social and economic indicators to support monitoring. Commenters suggested that the socioeconomic management actions and goals and objectives were too generic to provide meaningful management direction.	The socioeconomic section is organized to facilitate presentation and BLM considers that it need not be organized in the same way as other sections as long as the necessary content is present. The BLM reviewed the socioeconomic affected environment for presence of all the required information and made edits as necessary. Clarification on the regional context and the choice of study region (three counties) has been added. Discussion of occupational and interest groups, of the distribution of communities, roads and resources and of impacts to specific counties or communities was expanded, to the extent possible. BLM has added clarification language and expanded sections to discuss impacts to specific counties and communities to the extent there is reliable predictive information. To address concerns regarding goals and objectives, BLM actions for management of other resources also have socioeconomic impacts and these actions are already described under those resources.

Issue Category	Summary Number	Summary Comment	Summary Response
Social and Economic	1037-3	Commenters asked the BLM to provide further explanation and analysis on the economic impacts, including cumulative impacts, of BLM management decisions on livestock grazing and other agricultural operations. Commenters went on to suggest the BLM clarify how AUM decisions are made relative to the RMP process.	BLM maintains records of various indicators of economic activity on BLM-administered lands, including leases, visitation estimates, grazing allotment AUMs, among others. The socioeconomic analysis done in this EIS makes use of these indicators in the analysis of alternatives. A discussion of indicators has been included in the analysis. A qualitative discussion of the potential environmental costs associated with resource uses has been added. A discussion of non-market values associated with both livestock operations and environmental values has also been added. Current grazing meets the healthy rangeland standards, which is also the proposed alternative. The Draft EIS addresses cumulative impacts (e.g., see p. 1452, 1454, 1456, and 1458 addressing the concerns raised in county land use plans related to BLM management actions that affect the continued financial viability of livestock operators). Language has been added in the cumulative impacts section to ensure that this concern is considered. The BLM has added discussion language of indicators and added explanations regarding AUMs to Appendix U (p. 2589).

Issue Category	Summary Number	Summary Comment	Summary Response
Social and Economic	1037-4	Commenters questioned the BLM's approach to the socioeconomic analysis and in particular to the Impact Analysis for Planning Model (IMPLAN). Commenters expressed concern that IMPLAN failed to capture impacts at the disaggregated scale of a local community, modeled only three economic sectors, and did not address uncertainty associated with the analysis assumptions. Recommendations for additional analysis included geographic dispersion of impacts among communities of the planning area including jobs, non-market values of grazing and resident recreation, economic impacts of constraints from additional seasonal restrictions and management layers.	As noted in the Draft EIS, data are not sufficient to develop reliable estimate of earnings and jobs in other sectors, by alternative. The BLM has revised the document and added language where necessary to clarify. IMPLAN results are typically not expressed as full-time equivalents; this point has been clarified. The document has been edited as follows: a. Chapter 4 has been expanded to discuss impacts to specific counties or communities, to the extent possible b. Discussion was added on non-market values c. Discussion was added on seasonal restrictions
Health and Safety	1038-1	Commenters expressed concern that timing limitations could potentially limit the ability of operators to conduct repairs and maintenance operations on producing wells, causing or exacerbating safety and environmental issues.	BLM does intend to regulate disruptive activities; however; there are provisions to provide for emergencies and other necessary operations in accordance with the CFR. It is the operator's responsibility to schedule those routine operations that can be scheduled outside timing limitation windows accordingly.
Edit, Grammar, Punctuation, Spelling, Readability	1039-1	Commenters recommended a number of editorial revisions in the Draft RMP and EIS including spelling and grammar corrections. Commenters also recommended additions and revisions to the glossary, incorporating updated guidance, adding specific terminology or clarifying language, and improving readability.	The BLM evaluated all requests regarding readability, editorial suggestions, reference citations, and suggested additions and corrections, and revised the document, as appropriate. The BLM updated the Proposed RMP and Final EIS to include additional citations to the sources as appropriate to support the determinations, and made various editorial changes and provided clarifying text as needed.

Y.4.3. Non-Substantive Comments

In addition to the substantive comments summarized and responded to above, the BLM received numerous non-substantive comments during the public comment period. In accordance with BLM NEPA Handbook (H-1790-1), a formal response to non-substantive comments is not required; however, the BLM has reviewed and acknowledges all comments received. Non-substantive comments generally included:

- Comments in favor of or against management alternatives and allocations without reasoning that meet the criteria for substantive comments (e.g., we disagree with the Preferred Alternative and believe the BLM should select Alternative C)
- Comments that only agreed or disagreed with BLM policy or resource decisions without justification or supporting data that meet the criteria for substantive comments (e.g., the BLM needs to better manage oil and gas development in the planning area)
- Comments that did not pertain to the Buffalo planning area
- Comments that were outside the scope of analysis for the RMP and EIS (such as comments related to revision and update of laws, policies, and regulations)
- Comments that took the form of vague, open-ended questions or statements that did not meet the criteria for substantive comments

Y.5. Conclusion

The BLM revised the Draft RMP and EIS and prepared the Proposed RMP and Final EIS in response to substantive public comments received during the public comment period. The BLM will continue to consider public, agency, and other stakeholder comments through completion of the Buffalo RMP revision, as appropriate.