CHAPTER 4—ENVIRONMENTAL CONSEQUENCES

The "federal action" is the selection of a coordinated activity plan (CAP) on which future Bureau of Land Management (BLM) land use actions would be based. The purpose of this chapter is to determine the potential for significant impact of the federal action on the human environment. As defined in 40 Code of Federal Regulations (CFR) §1508.14, the "human environment" is interpreted comprehensively to include natural and physical resources and the relationship of people with those resources.

This chapter discusses the effects each alternative could have on various environmental, socioeconomic, and land use program areas (see Table 2-4 at the end of Chapter 2 for summary of impacts). Analysis of the alternatives has focused on identifying types of impacts and estimating their potential significance. The impact analysis for the No Action Alternative was prepared first as the baseline for the alternatives analysis. It contains a detailed discussion of impacts used for comparison with other alternatives. Where impacts are the same among alternatives, reference is made to those alternatives so that impacts are not repeated. However, the analysis under the Proposed Jack Morrow Hills (JMH) CAP does not make such references, and impacts are fully discussed.

4.1 TYPES OF IMPACTS

The terms "impact" and "effect" are synonymous. Impacts can be direct, indirect, or cumulative. A direct impact is caused by an action and occurs at the same time and place. An indirect impact occurs later in time or is farther removed in distance, but it is related to the action by a chain of cause and effect. Indirect impacts may reach beyond the natural and physical environment (i.e., environmental impact) to include growth-inducing effects and other effects related to induced changes to resource users (i.e., nonenvironmental impact).

An impact can be adverse or beneficial. An impact is considered adverse when the outcome of the action results in undesirable effects. A beneficial impact can result if the current condition is improved. Although beneficial impacts are identified, the analysis focuses on those impacts that are adverse in determining whether the effects are significant or insignificant. The criteria used to differentiate between significant and insignificant effects are introduced in the next section.

Adverse impacts can be mitigated through avoidance, minimization, restoration, reduction, or compensation. Mitigation measures are considered when identifying and implementing management actions and when determining and comparing impacts. Impacts may be reduced to less-than-significant levels if mitigation guidelines and standard practices are implemented. Mitigation measures may be imposed by regulation or through BLM policies and may be applied broadly or site-specifically. Standard practices and mitigation guidelines that would be implemented for particular activities are described in Appendices 5 and 6.

Cumulative impacts can result from individually minor but collectively significant actions' taking place over time. The Council on Environmental Quality (CEQ) describes cumulative impacts as follows:

> *The impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.*

- The cumulative impact analysis for this environmental impact statement (EIS) evaluates the potential impacts associated with the JMH alternatives, in combination with the potential impacts associated with other relevant activities that have occurred, are occurring, or may occur in the vicinity of the JMH CAP area. Cumulative impacts are discussed in Section 4.13 of this chapter.

4.2 DETERMINATION OF SIGNIFICANCE

The concept of significance used in this chapter encompasses several factors, including the magnitude of change from existing conditions and the likelihood of the change to occur. The context and the intensity of the impact are also considered. Context relates to the environmental circumstances at the location of the impact; intensity refers to the severity or extent of an impact.

In evaluating the context of an impact, the area or quantity of an affected resource relative to the available area or quantity of that resource is considered. The potential for change in growth and reproductive success of a species, maintenance of a population at preproject levels, and period of recovery after disturbance are other factors considered. The intensity of an impact is dependent on several factors, including the potential for violation of laws or regulations; the degree of uncertainty and controversy; the degree of adverse effect on specific concerns such as public health and safety, unique resources, or threatened and endangered species; and the resilience of the resource.

Determining significance is complex. The significance of a resource or impact is dynamic and may change during the planning period. Significance can be “real” and supportable by fact or “perceived” and perhaps not fully supportable even through rigorous study. For this analysis, the approach for establishing significance criteria was based on legal issues, public perception, and professional judgment. Significance criteria are introduced in the specific resource categories.

4.3 ANALYSIS METHODS

Impact analysis is a cause and effect process. Analysis methods identified resources that would be considered important for reasons such as legality, uniqueness, availability, or resilience, and then predicted changes to these resources. The magnitude or scale of the resource change was defined, and a judgment made as to the significance of that change.

Potential impacts of certain land use activities can be compared visually and numerically among the alternatives by using geographic information system (GIS) coverages and databases. The locations of resources and overlapping issues are shown in Maps 1 through 87. The approximate geographic size of these resources is listed in Table 3-1 at the end of Chapter 3, and the magnitudes of the overlapping resource issues are compared among the alternatives in Tables 4-1 to 4-10 at the end of Chapter 4. These tables and maps should be reviewed in conjunction with the discussion of impacts in the following sections.

Environmental impacts associated with the management alternatives are caused by land use activities. Certain assumptions are made regarding level of land use activity, resource condition, and resource response as a basis for determining potential impacts. The analysis considered the following:

- Restrictions or prohibitions on activities in specific areas to protect sensitive resources
- Mitigation requirements that prevent or limit direct impacts associated with land use activities or that reclaim the land after the activity has been completed

- Standards and guidelines that assess rangeland health and provide strategies to achieve resource conditions and management objectives
- Projections of the level of activity for land uses based on historical trends; existing land use agreements, such as leases or permits; and statements of interest in land use by individuals and industry organizations
- Impacts of land use activities that occur regardless of location of the land use, and impacts dependent on the location of the activity and potentially affected resources.

BLM manages public lands for multiple uses in accordance with the Federal Land Policy and Management Act (FLPMA). Land use decisions are made that protect the resources while allowing different uses of those resources, such as livestock grazing, energy development, and recreation. Where there are conflicts between resource uses, or where a land use activity might result in unacceptable or irreversible impacts on the environment, BLM may restrict or prohibit some land uses in specific areas. To ensure that BLM meets its mandate of multiple use in land management actions, the impacts of the alternatives on resource users (albeit nonenvironmental impacts) are identified and assessed as part of the planning process. The projected impacts on land use activities and the associated environmental impacts of land uses are characterized and evaluated for each management alternative in the following sections. It is important to note that all management prescriptions for each resource and resource use directly and/or indirectly relate to each other; therefore, impacts of other prescriptions and guidance may apply to each resource management activity.

4.4 LAND AND WATER RESOURCES

The land and water resource management category encompasses the biological and hydrologic resources and the users and land use programs associated with those resources. The significance criteria and analysis assumptions are described within each subcategory.

4.4.1 Potential Impacts on Fire

The fire management program is a land use program that has both adverse and beneficial environmental impacts on resources and nonenvironmental effects on resource users. Impacts on resources and resource users resulting from implementation of the fire management program are discussed in those particular resource sections. This section describes potential impacts on the fire management program resulting from the implementation of management actions for other resource management categories.

Adverse impacts on the fire management program would be considered significant if management actions or activities increased the costs related to the fire management program to the point where the overall effectiveness of the program was reduced.

It is assumed that a direct relationship exists between density of human use within the planning area and the frequency of person-caused fires and that a direct relationship exists between fuel loads (standing and nonstanding vegetation) and potential fire size and intensity. Prescribed burns would be limited throughout the planning area and planning period. The potential for land treatments through the use of prescribed fire would be limited. Some areas of dense overmature Wyoming and mountain big sagebrush could benefit from planned ignitions. The amount of area to be treated with prescribed fire is not expected to exceed 5,000 acres over the 20-year planning period.

4.4.1.1 Common to All Alternatives

The management actions associated with the alternatives would primarily impact the fire management program by affecting costs associated with prescribed burns and wildfire suppression efforts. Program costs would increase because of increased fire frequency and increased fire size and/or intensity. The level of significance of any impact would depend on the number of wildfires occurring in any given year. Adhering to the Fire Management Implementation Plan for BLM-Administered Public Lands and the National Fire Plan would assist in maintaining the program as planned and budgeted.

Activities that would affect fire frequency under all alternatives include off-highway vehicle (OHV) use, recreational activity, livestock grazing, and mineral exploration and development. These activities introduce additional ignition sources into the planning area, which in turn increase the probability of wildfire occurrence. The activities can occur in remote areas, which would affect the time and cost related to transporting fire suppression equipment to such locations. Livestock grazing can also affect fire frequency by reducing fine fuels, which decreases the probability of ignition. This could benefit the fire management program by decreasing fire fighting costs but could also adversely impact the opportunity for positive effects of fire.

Fire size and intensity can be affected by the level of fire suppression activities allowed and by activities that increase or decrease fuel loading. The restrictions and limitations placed on fire suppression activities within special management areas and around heritage sites could adversely affect the ability of firefighters to protect these sites from wildfires. However, limiting suppression activities to existing roads and trails could reduce suppression-related costs by focusing suppression efforts on existing fuel breaks.

Livestock grazing could also increase fire intensity by decreasing fire frequency. Decreasing the probability of ignition through the reduction of fine fuels could provide more time for the accumulation of larger fuel sources (e.g., shrub vegetation) between fires. When properly managed, livestock grazing activity would leave sufficient fine fuel to allow for ignition. Excessive removal of fine fuels caused by overgrazing could lead to increased brush size and density, which could also increase fire intensity. However, this is not anticipated because of the implementation of the Wyoming Standards for Healthy Rangelands and the desired plant community (DPC) objectives, which would ensure that widespread overgrazing would not occur. Fine fuel reduction by grazing livestock could also adversely impact fire prescription activities by limiting the ability of an area to support prescribed fire as a management tool.

Factors affecting the costs associated with prescribed burns include restrictions on vehicle and other equipment use, construction of control lines in areas of sensitive resources, and timing requirements for burns in sensitive watersheds. Approximately 5,000 acres of prescribed burns are proposed over the planning period. Any adverse impacts on the fire management program due to prescribed burning would be minimal, because there should be adequate planning, timing, and budgeting for this type and level of activity.

4.4.1.2 No Action Alternative

Mineral exploration, development and production increase the potential for wildfire occurrence by increasing the number of ignition sources, which in turn increases the cost of managing fire within the planning area. Development of 221 oil and gas wells is anticipated under this alternative (Appendix 13), which would act as potential ignition sources throughout the planning area. Closing areas to fluid mineral development under this alternative (Map 10) would diminish development activity and consequently reduce adverse impacts on the fire management program.

Recreational activities such as camping and OHV use have the potential to increase fire frequency by increasing the number of ignition sources (e.g., campfires and catalytic converters). Further, because these activities often occur in remote areas, costs related to transporting fire suppression equipment could increase. Under this alternative, camping would be allowed throughout the planning area (except where necessary to protect water quality and wildlife), which could increase fire management costs by increasing fire activity over a large area. Limiting OHV use to designated and existing roads and trails could minimize the potential for fires ignited by these vehicles.

The impacts of wild horse management actions on the fire management program would be somewhat similar to those resulting from livestock grazing, but on smaller scale and over a smaller area. Management of wild horses could reduce fine fuels through foraging activities and thereby reduce the probability of ignition. This could also increase fire intensity by providing more time for the accumulation of larger fuel sources (e.g., shrub vegetation) between fires. Excessive removal of fine fuels could lead to increased brush size and density, which could increase fire intensity. However, this is not anticipated because of the implementation of the Wyoming Standards for Healthy Rangelands and DPC objectives, which would ensure that widespread overuse would not occur.

Vegetation management actions could have both beneficial and adverse impacts on the fire management program. Beneficial impacts could result from reducing fire size and/or intensity by maintaining healthy and diverse vegetation communities. Highly diverse vegetation communities promote mosaic vegetation patterns that slow the spread of fires. Beneficial impacts would also be realized by applying full fire suppression in basin big sagebrush/lemon scurfpea vegetation associations, which would help reduce fire size and/or intensity. Adverse impacts could include increased costs related to prescribed burn stipulations (e.g., spring burning) and fire suppression restrictions within certain sensitive vegetation resources (e.g., vehicular suppression activities limited to existing roads and trails within special status plant species habitat). Using prescribed burns as a vegetative treatment would be planned in advance and thus should not significantly impact the fire management program.

4.4.1.3 Alternative 1

Impacts on the fire management program from implementing management actions for wild horses and vegetation would be the same as those under the No Action Alternative.

Although camping activities are anticipated to be similar to those of the No Action Alternative, increased OHV use would be expected within the planning area because there would be more available areas in which to travel. This would increase the potential for increased fire frequency and related costs.

This alternative provides the greatest opportunity for mineral development and production, which could affect fire management. More of the planning area would be open to all types of mineral exploration and development, which could increase the potential for human-caused fires by increasing the number of ignition sources. However, the increased and/or improved access and construction of fuel breaks resulting from increased mineral activities could improve suppression opportunities and effectiveness. The level of significance of these impacts would depend on the fire frequency in any given year.

Under this alternative, the anticipated use of livestock animal unit months (AUM) would increase over the planning period to the permitted active use amount, which is approximately double the historic use. This would increase the impacts of livestock grazing on the fire management program.

Activities related to special management areas under this alternative could reduce localized effects on fire management. Removing the area of critical environmental concern (ACEC) designation from Steamboat Mountain ACEC and reducing the South Pass Historic Landscape viewshed would eliminate the specific

management actions associated with these areas, which would in turn reduce the area subject to fire suppression-related limitations and restrictions.

4.4.1.4 Alternative 2

Impacts on the fire management program from implementing management actions for vegetation would be the same as those under the No Action Alternative.

The Divide Basin Wild Horse Herd Management Area (HMA) would be reduced to exclude the planning area. This would remove from the planning area wild horses that would otherwise affect the fire management program through the reduction of fine fuels.

Recreation management activities could have less of an impact on fire management under this alternative than under the No Action Alternative. Camping would be allowed only in designated areas, and parties of five or more would require a group camping permit. Such restrictions would concentrate camping activities, thereby controlling the areas that could be adversely impacted by escaped campfires or other accidental ignitions. A large portion of the planning area would be closed to OHV use or subject to OHV limitations. These limitations would likely decrease fire frequency related to human recreational activity and have an overall beneficial effect on the fire management program.

This alternative provides the least opportunity for mineral development and production, which would result in reduced impacts on fire management compared with all other alternatives. More areas would be closed to all types of mineral development, which would decrease the potential for wildfire occurrence by reducing the number of ignition sources.

Activities related to special management areas could have greater impacts on the fire management program under this alternative than under the other alternatives. Management actions associated with the expansion of existing ACECs and historic viewsheds and management of new ACECs within the planning area could increase the area subject to fire suppression-related limitations and restrictions, which could increase related costs and reduce the ability of firefighters to protect these sites from wildfires. However, limiting suppression activities to existing roads and trails could reduce suppression-related costs by focusing suppression efforts on existing fuel breaks. The level of significance of these impacts would depend on the number of wildfires occurring in these special management areas in any given year.

4.4.1.5 Alternative 3

Impacts on the fire management program from implementing management actions for vegetation would be the same as those under the No Action Alternative.

Recreation management activities could have less of an impact on fire management under this alternative than under the No Action Alternative. Camping would be allowed only in designated areas, and parties of 10 or more would require a group camping permit. Such restrictions would concentrate camping activities, thereby controlling the areas that could be affected by escaped campfires or other accidental ignitions. Additional portions of the planning area would be closed to OHV use or subject to OHV limitations. These limitations would likely decrease fire frequency related to human recreational activity and, consequently, the cost of managing fire within the planning area.

Impacts on the fire management program from mineral development would be slightly less than under the No Action Alternative, because of development of fewer oil and gas wells. Development of 205 wells is anticipated under this alternative (Appendix 13), which would act as potential ignition sources throughout the planning area. Closing areas to fluid mineral development under this alternative (Map 42) would

diminish development activity and consequently reduce adverse impacts on the fire management program.

Expanding the Divide Basin Wild Horse HMA to include the entire planning area could increase the beneficial and/or adverse effects associated with wild horses (reduction of fine fuels via foraging) on the fire management program by allowing wild horses to graze more areas. However, this additional impact would not be significant because the number of horses allowed in the expansion area would be limited.

Impacts related to special management areas would be similar to those under Alternative 2, but not as great. Management actions associated with fewer designations and less expansion of special management areas under this alternative would result in fewer limitations and restrictions on fire suppression activities.

4.4.1.6 Proposed JMH CAP

The management actions associated with this alternative would impact the fire management program primarily by affecting costs associated with prescribed burns and wildfire suppression efforts. Program costs would increase because of increased fire frequency and increased fire size and/or intensity. Adhering to the Fire Management Implementation Plan for BLM-Administered Public Lands and the National Fire Plan would assist in maintaining the program as planned and budgeted.

Management of heritage resources could adversely impact fire management by placing restrictions on fire suppression activities. Protections afforded to heritage resources and surrounding areas include fire suppression-related limitations and restrictions, which could affect the ability of firefighters to protect these sites from wildfires. However, limiting suppression activities to existing roads and trails could reduce suppression-related costs by focusing these efforts on existing fuel breaks. The level of significance of these impacts would depend on the number of wildfires occurring in these areas in any given year.

Prescribed burning could adversely affect the fire management program by increasing costs. Factors could include restrictions on vehicle and other equipment use, construction of control lines in areas of sensitive resources, and timing requirements for burns in sensitive watersheds. Approximately 5,000 acres of prescribed burns are proposed over the 20-year planning period. Any adverse impacts on the fire management program due to prescribed burning would be minimal because there should be adequate planning, timing, and budgeting for this type and level of activity.

Mineral exploration, development, and production increase the potential for wildfire occurrence by increasing the number of ignition sources, which in turn increases the cost of managing fire within the planning area. Impacts on the fire management program under this alternative would be similar to those under Alternative 3, with development of 205 wells (Appendix 13). However, the strategy for implementing fluid mineral leasing decisions under this alternative (Appendix 17) could affect the degree of impact in certain areas. There would be no new oil and gas leasing in the majority of Area 3 (Figure A17-1), which could reduce impacts in this area over the long term. However, this could also result in more rapid exploration and development of existing leases in Area 3 because there would not be any opportunity to renew leases upon expiration. Moreover, given that much of this area is within the high development potential area (Map 69), successful well completion rates are expected to be high. These factors could result in the introduction of substantially more ignition sources over a relatively short period of time, potentially increasing impacts on fire management compared with Alternative 3.

Recreational activities such as camping and OHV use have the potential to increase fire frequency by increasing the number of ignition sources (e.g., campfires and catalytic converters). Furthermore, because of the remote areas in which these activities often occur, costs related to transporting fire suppression

equipment might increase. Under this alternative, camping would be allowed throughout the planning area (except where necessary to protect water quality and wildlife), which could increase fire management costs by increasing fire activity over a larger area. Placing limitations on OHV use and closing certain areas to such use could minimize the potential for fires ignited by these vehicles.

Livestock grazing can affect fire frequency by reducing fine fuels, which decreases the probability of ignition. This could benefit the fire management program by decreasing fire fighting costs but could also adversely impact the opportunity for positive effects of fire. Livestock grazing could also increase fire intensity by decreasing fire frequency. Decreasing the probability of ignition through reduction of fine fuels could provide more time for the accumulation of larger fuel sources (e.g., shrub vegetation) between fires. When properly managed, livestock grazing activity would leave sufficient fine fuel to allow for ignition. Excessive removal of fine fuels caused by overgrazing could lead to increased brush size and density, which could also increase fire intensity. However, this is not anticipated because of the implementation of the Wyoming Standards for Healthy Rangelands and DPC objectives, which would ensure that widespread overgrazing would not occur. Fine fuel reduction by grazing livestock could also adversely affect fire prescription activities by limiting the ability of an area to support prescribed fire as a management tool.

Impacts of wild horse management actions on the fire management program would be somewhat similar to those resulting from livestock grazing, but on smaller scale and over a smaller area. Management of wild horses could reduce fine fuels through foraging activities and thereby reduce the probability of ignition. This could also increase fire intensity by providing more time for the accumulation of larger fuel sources (e.g., shrub vegetation) between fires. Excessive removal of fine fuels could lead to increased brush size and density, which could increase fire intensity. However, this is not anticipated because of the implementation of the Wyoming Standards for Healthy Rangelands and DPC objectives, which would ensure that widespread overuse would not occur.

Vegetation management actions could have both beneficial and adverse impacts on the fire management program. Beneficial impacts could result from reducing fire size and/or intensity by maintaining healthy and diverse vegetation communities. Highly diverse vegetation communities promote mosaic vegetation patterns that slow the spread of fires. Beneficial impacts would also be realized by applying full fire suppression in basin big sagebrush/lemon scurfpea vegetation associations, which would help reduce fire size and/or intensity. Negative impacts could include increased costs related to prescribed burn stipulations (e.g., spring burning) and fire suppression restrictions within certain sensitive vegetation resources (e.g., vehicular suppression activities limited to existing roads and trails within special status plant species habitat). Using prescribed burns as a vegetative treatment would be planned in advance and thus should not significantly impact the fire management program.

Activities related to special management areas and other management areas could result in greater impacts on the fire management program than under the No Action Alternative. Management actions associated with the expansion of the Steamboat Mountain ACEC and management of the West Sand Dunes Archaeological District and Steamboat Mountain Management Area could increase the area subject to fire suppression-related limitations and restrictions, which could increase related costs and affect the ability of firefighters to protect these areas from wildfires. However, limiting suppression activities to existing roads and trails could reduce suppression-related costs by focusing these efforts on existing fuel breaks. The level of significance of these impacts would depend on the number of wildfires occurring in these special management areas in any given year.

4.4.2 Potential Impacts on Water Resources

Water resources include surface and subsurface water resources and the quality of each. Resources include perennial, intermittent, and ephemeral waterways; riparian areas; wetlands; floodplains; groundwater recharge areas; and groundwater. Impacts on resources and resource users resulting from implementation of water resource management actions are discussed in those particular resource sections. This section describes potential impacts on water resources resulting from the implementation of management actions for other resource management categories.

Adverse impacts on water resources as a result of human activities would be considered potentially significant if proper functioning condition (PFC) could not be attained or maintained as a minimum physical state or if Wyoming BLM Standards for Healthy Rangelands Standard #2 were not obtainable. Actions that accelerated erosion and runoff and thereby altered the physical characteristic of streams, wetlands, and riparian areas or degraded water quality beyond the designated use of the receiving stream (Table 3-5) would be considered a significant impact. Any loss of wetlands or wetland function or violation of the requirements of Section 404 permits would also be considered a significant impact.

Analysis of impacts on water resources is based on achieving the watershed objectives of stabilizing and conserving soil; increasing vegetative production; maintaining or improving surface and groundwater quality; and protecting, maintaining, or improving wetlands, floodplains, and riparian areas.

It is assumed that any substantial disturbance to the soils or changes in vegetative cover would have an adverse effect on watershed health and water quality. Surface disturbances result in accelerated erosion and runoff, increasing sediment and nutrient loads to local channels. The degree of impact attributed to any one disturbance or series of disturbances is influenced by location within the watershed, soil type, time and degree of disturbance, existing vegetation, and precipitation.

4.4.2.1 Common to All Alternatives

Fire could have both long-term beneficial and short-term adverse impacts on water resources, the degree of which would depend on fire size, timing, and fuel type. Adverse impacts could include increased runoff from exposed soils and sedimentation of surface waters. Over the long term, positive impacts could include increased age and species diversity of plant communities, enhanced nutrient cycling, and increased plant vigor, which would slow erosion rates and improve watershed health and water quality. Wildfires usually have more adverse impacts than do prescribed burns because wildfires generally cover larger areas and remove more vegetation, and, if burning outside established prescription, often burn with enough heat to adversely affect soil organisms and damage the root system of some plants. This could result in long-term adverse impacts by compromising future plant rejuvenation and growth rates. Fire suppression activities could also result in adverse impacts on water resources by increasing soil erosion from fire line construction and heavy equipment transport. Prescribed fires generally result in long-term beneficial effects on watershed health and water quality. The significance of any impact would depend on the amount of area burned, fire type, proximity to a water source, amount of sedimentation, and rate of revegetation.

Riparian areas would be managed to attain PFC as the minimum acceptable level of ecological condition. This would have a beneficial impact on watershed resources and water quality by helping to stabilize streambanks, reduce erosion and sediment yield, promote vegetative cover, and enhance water quality. Watershed assessments, increased monitoring efforts, and implementation of mitigation measures would improve the health of watersheds with sensitive baseline conditions, having a long-term beneficial impact on the resource. Water quality would be further protected through BLM's participation with federal,

state, and local government agencies to develop and implement salinity control plans for the Colorado River Basin.

Livestock grazing could have localized adverse impacts on watershed resources and water quality. Soil compaction and loss of vegetative cover could result in reduced soil infiltration, increased runoff, and sedimentation of surface waters. Other potential adverse impacts from livestock grazing activities could include channel destabilization, nutrient loading of surface waters, and promotion of invasive plant species. In addition, surface alterations and water depletions resulting from development of livestock pits, ponds and water wells could alter flow dynamics and cause overall degradation of the riparian corridor (see Appendix 3 and Section 4.4.6 for further details). Approximately 80 percent of the water used for livestock water developments would be from the Colorado River drainage, with the remaining amount coming from the Platte River drainage. Implementation of the Wyoming Standards for Healthy Rangelands and Guidelines for Livestock Grazing and DPC objectives would help ensure proper management of livestock resources and reduce adverse impacts on watershed resources and water quality.

Livestock water developments and range improvements would be designed to improve resource conditions and livestock distribution. They generally distribute livestock within the pasture/allotment in an effort to prevent livestock concentration and overuse of forage. The immediate area surrounding water developments would generally be adversely affected because of construction disturbances and livestock concentrations around the developments. This would accelerate runoff and erosion within the affected area and could adversely impact nearby surface waters by increasing sediment and nutrient loads. With proper planning and effective management of range improvements, adverse impacts on water resources would be minimized to acceptable levels.

Vegetation management activities would most likely result in beneficial impacts on watershed resources and water quality. The protective measures afforded to special status plant species and management actions to achieve the DPC objectives would have a beneficial effect on watershed resources by maintaining plant diversity and preserving ecological conditions. Preventing and controlling the spread of invasive plant species would also improve watershed health by reducing competition with native plants and maintaining biodiversity. Vegetation manipulation to enhance wildlife habitat would have short-term, adverse impacts on watershed resources by removing vegetation and consequently increasing erosion and sedimentation; however, long-term, beneficial impacts could be realized through increased age and species diversity of plant communities, enhanced nutrient cycling, and increased plant vigor.

Long-term beneficial impacts on water resources are anticipated from wildlife habitat management activities. Actions to improve wildlife habitat generally involve the protection of water sources and the promotion of diverse plant communities, which are better able to slow and filter overland flow, reduce erosive forces, and improve water quality. Short-term adverse impacts could occur where wildlife populations concentrate near water sources, potentially increasing erosion and sediment loads.

Management of heritage resources should have minimal impacts on watershed health and water quality. Management actions generally focus on the protection or preservation of heritage sites, which would in turn benefit water resources by limiting or excluding surface disturbing activities on or near such sites. Data recovery excavations could adversely affect watershed resources through surface disturbances and vegetation removal if not properly conducted. Indirect effects could occur if avoidance of cultural sites directed activities to other areas, possibly concentrating uses and increasing adverse impacts on local watersheds. However, because of the limited activity allowed in proximity to water resources, any adverse impacts would be insignificant. Protection measures afforded by the National Historic Preservation Act would further mitigate potential adverse impacts.

Recreational activities that occur in proximity to water sources could impact watershed resources and water quality. Camping and hiking adjacent to waterways could result in localized compaction of soils, vegetation removal, and streambank instability, which in turn could increase sediment, salt, and nutrient loads from increased runoff. Waste products from recreational activities near riparian areas could have localized adverse effects on aquatic resources. The use of OHVs could have an adverse impact on water resources, especially if the OHVs were used in an unauthorized manner. Such impacts could include erosion, soil compaction, and increased turbidity from unauthorized stream crossings and use of wetland meadows. OHV use limitations and visitor compliance with BLM's OHV designations would help prevent degradation of sensitive watersheds. Educational programs, such as "Tread Lightly," would further help reduce adverse impacts on land and water resources.

Surface disturbing activities, such as those associated with the construction of linear rights-of-way (ROW) for pipelines, transmission lines, and communication lines, and oil and gas development, including construction of well pads, mud pits, and roads, could impact water resources. Land clearing and grading activities necessary for construction remove vegetation and compact soils, which contributes to increased erosion and subsequent sedimentation of local surface waters. Water depletions from oil and gas drilling processes would reduce the total volume of flows to the Colorado River and Platte River drainages (see Appendix 3 and Section 4.4.6 for further details). Approximately 95 percent of the water used for drilling would be from the Colorado River drainage (i.e., 95 percent of the wells would be within this watershed), with the remaining amount coming from the Platte River drainage. Implementation of standard practices and mitigation measures would help minimize long-term adverse impacts on water resources by stabilizing soil conditions and promoting revegetation of disturbed areas. Disturbed sites would be monitored for effective reclamation, and linear ROWs would avoid or be excluded from sensitive areas whenever possible. If sensitive areas could not be avoided, appropriate mitigation measures would be applied.

Groundwater could be affected during construction of drill pads or by other exploration and development activities. Improper casing and cementing of wells, undetected spills, or leachate from produced water or mud pits could introduce contaminants into the groundwater. Chemicals used for production drilling could cause local contamination of soils and groundwater if not managed properly. Construction of drilling pads, proper disposal practices, proper casing and cementing, and recycling of drilling fluids would be in accordance with BLM guidelines and should minimize adverse effects on groundwater quality. Hydrological investigations would be conducted before coalbed gas development to determine whether any connection existed between surface waters and the aquifer that would be dewatered. Appropriate measures would be taken to prevent adverse impacts on water quality during dewatering. Dewatering during coalbed gas production could affect the quantity of groundwater by changing flow gradients. Given the present state and federal regulations regarding general water quality, as well as salinity and the Colorado River Basin, surface discharge of produced water is not anticipated. However, accidental surface discharges could adversely impact nearby surface water quality by increasing salinity levels. The extent of any impact would depend on the quality and quantity of the produced water and any fluids being released.

Irrigation diversions on private lands have a noticeable influence on channel dynamics and morphology. Pacific Creek, the primary stream system in the JMH CAP planning area, has been under the influence of irrigation diversions for close to 100 years. Irrigation diversions will most likely continue to be a noticeable influence in the future.

Management actions for special management areas could benefit watershed resources. Restrictions on development and other surface disturbing activities within these areas would help prevent accelerated erosion and sedimentation of surface waters.

4.4.2.2 No Action Alternative

Prescribed burns and wildfire suppression activities would have both short-term and long-term impacts on water resources like those described above under Impacts Common to All Alternatives. The minimal amount of proposed prescribed burns (approximately 5,000 acres) and the requirements for these activities (e.g., post-treatment rest, mosaic patterns, and limiting of suppression activities to existing roads and trails) would minimize adverse impacts by limiting the amount of exposed ground susceptible to erosion. The long-term benefits from fire would be minimized as well. Full fire suppression would be applied to basin big sagebrush/lemon scurfpea vegetation associations, which stabilize the sand dunes and maintain the integrity and stability of the watershed in which they grow.

Achieving and maintaining the appropriate management level (AML) for wild horses within the Divide Basin Wild Horse HMA would serve to maintain or improve watershed resources. Some trampling of riparian vegetation and subsequent erosion would occur, but this could be held to an acceptable level if the selective gathering program were successful in reducing and maintaining wild horse population levels. Concentration of wild horses near water sources could increase localized erosion and sediment loads caused by trampling and overgrazing of riparian vegetation. Construction of water developments to better distribute the horse herd would help minimize this effect.

Livestock grazing activities could impact water resources as described above in Impacts Common to All Alternatives. Implementation of the Wyoming Standards for Healthy Rangelands and Guidelines for Livestock Grazing would ensure that adverse impacts would not be significant. Under this alternative, exclosures and water developments would be constructed as needed to keep livestock out of sensitive riparian areas, thereby reducing the impacts on watershed health and water quality. Prohibiting placement of salt and mineral supplements within 500 feet of riparian areas would help minimize soil compaction and subsequent runoff near surface waters.

Recreational activities are not anticipated to have significant impacts on watershed resources. Although camping would be allowed within riparian corridors, areas would be closed if resource damage occurred, thereby preventing significant impacts. In addition, OHV use designations would help prevent OHV-related impacts from becoming significant.

Surface disturbing activities, such as those associated with mineral development and ROW construction activities, could cause impacts similar to those common to all alternatives. Actions that limit the extent of surface disturbing activities generally minimize impacts on surface water sources and recharge areas. Under this alternative, surface disturbance would be controlled within 500 feet of riparian areas, wetlands, and 100-year floodplains. Controlled use means that surface disturbing activities would avoid these areas unless a site-specific analysis determined that there would be no adverse impacts on water resources. Permanent facilities (other than linear facilities) would not be allowed within 100-year floodplains or wetland areas, and linear ROWs would be identified and collocated as much as practicable. These limitations would ensure that any adverse impacts on water resources would not be significant. Some surface disturbing activities might serve to maintain or improve water quality (e.g., reconstruction of crossings, road surfacing, gabions).

Development of 221 oil and gas wells is anticipated under this alternative, with 95 percent of these wells occurring in the Green River/Colorado River Basin. Using the assumption of 1.5 acre-feet of water per well, depletions from these actions would total approximately 390 acre-feet in the Colorado River drainage and 16.5 acre-feet in the Platte River drainage. Based on a 20-year time frame, the average annual depletion for the two drainages would be 19.5 acre-feet and 0.83 acre-feet, respectively.

4.4.2.3 Alternative 1

Impacts resulting from management actions for fire, recreation, and wild horses would be the same as those under the No Action Alternative.

Livestock grazing management would likely have greater impacts on water resources under this alternative than under the No Action Alternative. The anticipated use of AUMs would increase over the planning period to the fully permitted active use amount, which is approximately double the historic use. This could put greater pressure on watershed resources, potentially causing increased erosion, sedimentation, and bank instability. These additional impacts would be realized only on allotments that are not currently close to using their fully permitted AUMs. In addition, under this alternative, salt and mineral supplements could be placed within 250 feet of water resources (compared with the 500-foot minimum distance under the No Action Alternative), and would therefore have a greater potential for subjecting surface waters to increased sediment loads. Livestock water developments would be permitted wherever they enhanced livestock production, as opposed to enhancing livestock distribution as under the No Action Alternative. This could increase localized erosion and sedimentation of surface waters, possibly resulting in significant impacts. Existing riparian exclosures could be removed under this alternative and the area made available to livestock grazing, consequently increasing grazing pressures along riparian corridors. This could result in degradation to these riparian areas depending on current livestock management. Implementation of the Wyoming Standards for Healthy Rangelands and Guidelines for Livestock Grazing would help minimize adverse impacts.

Benefits to watershed resources from wildlife management actions would be less extensive than under the other alternatives because there would be less emphasis on improving wildlife habitat and fewer habitat protection measures under this alternative.

Of the five alternatives, this alternative would provide the least amount of protection to riparian areas and floodplains from surface disturbing activities, which could result in an increase in related impacts. The amount of land area subject to the controlled surface use stipulation would be reduced. Specifically, the avoidance area surrounding riparian areas and 100-year floodplains would be reduced to 250 feet, allowing surface disturbing activities to occur closer to water resources. Similarly, the avoidance area for intermittent and large ephemeral drainages would be reduced to 50 feet. New permanent facilities would be allowed in floodplains, wetlands, and riparian areas provided that no practicable alternatives were available for placing the facility elsewhere and that appropriate mitigation measures would be implemented. The level of significance of impacts would depend on whether the buffer zones were large enough to adequately attenuate impacts related to surface disturbing activities.

Additional land area would be open for linear ROWs under this alternative, which could allow increased construction activities to occur within sensitive watersheds. This could cause further degradation of watershed resources and water quality, and depending on where and to what degree the ROW activities occurred, impacts could be significant.

It is assumed that the amount of mineral exploration and development that would occur during the planning period would be related to the amount of acreage available for such development. The land area available for lease and mining claims would be greatest under this alternative; thus, the potential for mineral development would likely increase. This would result in greater surface disturbance and related adverse impacts on water resources because of increased potential for exposed soils, erosion, runoff, sedimentation of surface waters, and salt and nutrient loading. Development of more wells would also increase annual water depletions from the Colorado River and Platte River drainages. Using the assumption of 1.5 acre-feet of water per well over the 20-year planning period and development of 264 wells, water depletion from these activities would total approximately 451.5 acre-feet in the Colorado

River drainage and 19.5 acre-feet in the Platte River drainage. Based on a 20-year time frame, the average annual depletion for the Colorado River and Platte River drainages would be 22.5 acre-feet and 0.98 acre-feet, respectively. The level of significance for all of these impacts would depend on the rate and location of development activities and the rate and effectiveness of reclamation.

Management activities related to special management areas under this alternative could reduce opportunities to maintain or improve water resources. Removing the ACEC designation from Steamboat Mountain ACEC and reducing the South Pass Historic Landscape viewshed would eliminate specific management actions associated with these areas, which would in turn reduce the area subject to surface disturbance restrictions and limitations, potentially reducing benefits to water resources.

4.4.2.4 Alternative 2

Impacts resulting from vegetation management would be the same as those under the No Action Alternative.

Under this alternative, the fire management program would have similar impacts to those discussed under the No Action Alternative. However, prescribed burns would not be considered under this alternative, which would eliminate both the positive and negative impacts of this activity. In addition, limited fire suppression (as opposed to full suppression) would be applied to the basin big sagebrush/lemon scurfpea vegetation associations, which could increase their susceptibility to fire. This could result in destabilization of the sand dunes and related impacts on water resources. In contrast, reducing the level of disruptive fire suppression activities could actually result in less erosion and less subsequent sedimentation of surface waters.

Adverse impacts from wild horse management actions could occur in the portion of the Divide Basin Wild Horse HMA located outside the planning area. Under this alternative, the HMA would be modified to exclude the planning area while maintaining the current AML for the herd. Although this would benefit water resources within the planning area, indirect adverse impacts could occur in the remainder of the HMA because of the concentration of approximately the same number of wild horses within a smaller area.

Under this alternative, livestock grazing management would most likely have fewer impacts on water resources than under the other alternatives. Although livestock operators could increase AUM use to the fully permitted amount, anticipated use of AUMs would be similar to historic levels. Salt and mineral supplements would not be allowed within one-half mile of riparian resources, thereby further reducing related impacts. Whether the one-half-mile distance would provide greater protection to riparian areas than would some shorter distance could depend on the topography, drainage patterns, and vegetative cover at a particular location. Within sensitive wildlife habitat, livestock water developments would be allowed only if resource conditions were improved. This could benefit water resources through improved planning of such developments. Moreover, only 11 water developments would be constructed under this alternative (compared to 23 under all other alternatives), which would lessen annual water depletions (2.8 acre-feet versus 5.75 acre-feet) from the Colorado River and Platte River drainages. Exclosures would be maintained and new ones constructed as needed to keep livestock out of sensitive riparian areas, which would maintain or improve riparian corridors.

Beneficial impacts on watershed resources from wildlife management activities would likely be greatest under this alternative because of expanded protection of and habitat enhancement for wildlife resources. Specifically, placing a no surface occupancy (NSO) stipulation on big game birthing areas and greater sage-grouse winter range and concentration areas would limit the type and degree of surface disturbing activity occurring in these areas, thereby reducing erosion, runoff, and sedimentation of surface waters.

Increased protection would be afforded to heritage resources under this alternative, which could increase beneficial impacts on watershed resources and water quality as compared to the other alternatives. Buffer zones around most sites eligible for inclusion in the National Register of Historic Places (NRHP) would be increased to 300 feet. Because surface disturbing activities are prohibited within these buffers, the potential for erosion and sedimentation of surface waters would be reduced.

Recreation management activities would have less of an adverse impact on watershed resources and water quality under this alternative than under all other alternatives. Camping would be allowed only in designated areas, and parties of five or more would require a group camping permit. Such restrictions would limit camping along streams and within sensitive areas, reducing related impacts on water resources. The area closed to OHV use would increase, thus reducing the potential for accelerated erosion and sedimentation related to OHV use.

Of the five alternatives, this alternative would provide the most protection to water resources from surface disturbing activities, primarily because a greater amount of land area would be subject to NSO requirements or ROW exclusion. Any actions that limit the extent of surface disturbing activities help minimize adverse impacts on surface water sources and recharge areas. Surface disturbance would be controlled within one-quarter mile of riparian areas, wetlands, and 100-year floodplains. Permanent facilities would not be allowed in 100-year floodplains, riparian areas, or wetlands, and linear ROWs would be identified and collocated as much as practicable. This larger avoidance area surrounding riparian areas and floodplains could provide considerably more protection to water resources. The degree of adverse impact would depend on the size and type of the activity and on the topography and drainage patterns of the activity location. This alternative would also include site-specific management prescriptions to protect the ecological integrity of the dunal ponds (flockets), which would have a beneficial effect on this unique water resource. Opportunities to construct structures that could enhance watershed resources (e.g., gabions, fences) would be limited in this alternative.

It is assumed that the amount of mineral exploration and development that would occur during the planning period under this alternative would be related to the amount of acreage available for such development. The land area available for lease and mining claims would be the most restrictive under this alternative; thus, the potential for mineral development would likely decrease. Withdrawing areas from mineral development reduces the degree to which surface disturbance can occur, which in turn reduces adverse impacts on watershed resources and water quality. Development of fewer wells would considerably lessen annual water depletions from the Colorado River and the Platte River drainages. Using the assumption of 1.5 acre-feet of water per well over the 20-year planning period and development of 163 wells, water depletions from these actions would total approximately 270 acre-feet in the Colorado River drainage and 12 acre-feet in the Platte River drainage. Based on a 20-year time frame, the average annual depletion for the Colorado River and Platte River drainages would be 13.5 acre-feet and 0.6 acre-feet, respectively.

Management actions related to special management areas could have a greater beneficial effect on water resources under this alternative. Management actions associated with expansion of existing ACECs and historic viewsheds and management of new ACECs within the planning area could increase the area subject to surface disturbance restrictions and limitations, and thus limit potential adverse impacts resulting from exposed soils and subsequent erosion and surface runoff.

4.4.2.5 Alternative 3

Impacts resulting from management of the fire program and vegetation resources would be the same as those under the No Action Alternative.

Expanding the Divide Basin Wild Horse HMA to include the entire JMH CAP planning area could better distribute wild horses and reduce use in riparian areas within the current HMA. In contrast, this action could have additional adverse impacts on riparian areas because more of these areas would be included in the expanded HMA. Introducing wild horse grazing activities to new areas could result in overuse of riparian habitat, leading to accelerated erosion and sedimentation of water resources. Ensuring that no more than 100 horses were allowed in the expansion area could minimize this effect. However, this would likely not be realized until herd levels reached and maintained the AML because wild horses currently inhabit areas outside the existing HMA boundary.

Livestock grazing activities under this alternative could have adverse impacts on water resources similar to those under the No Action Alternative. Although livestock operators could increase AUM use to the fully permitted amount, anticipated use of AUMs would be similar to historic levels. Implementation of the Wyoming Standards for Healthy Rangelands and Guidelines for Livestock Grazing would ensure that adverse impacts on water resources from grazing practices would not be significant. Exclosures and water developments would be constructed as needed to keep livestock out of sensitive riparian areas, which would have a beneficial impact on watershed health and water quality. Prohibiting placement of salt and mineral supplements within one-quarter mile of riparian areas would minimize soil compaction that promotes runoff and sedimentation of surface waters. Whether the distance of one-quarter mile would be adequate to prevent adverse impacts on riparian areas or would be excessive would depend on topography, drainage patterns, and the amount of vegetative cover at a particular salt block location.

Benefits to watershed resources from wildlife management activities would most likely increase under this alternative compared with the No Action Alternative because of expanded protection and habitat enhancement for wildlife resources.

Recreation management activities under this alternative would have less impact on watershed resources and water quality than would those under the No Action Alternative. Dispersed camping would be allowed only in designated areas, and parties of 10 or more would require a group camping permit. Such restrictions would limit camping along streams and within sensitive areas, reducing related impacts on water resources. Impacts would likely be more extensive than under Alternative 2 because measures designed to limit adverse impacts would not be as restrictive. The amount of area closed to OHV use or limited to existing roads and trails would be less than that under Alternative 2, which could increase the potential for soil exposure, accelerated erosion, and sedimentation of water sources. The level of significance of this impact would depend on the concentration of OHV use in proximity to water sources and watersheds of concern.

This alternative would provide more protection to water resources from surface disturbing activities than would the No Action Alternative and Alternative 1, primarily because greater land area would be subject to controlled surface use requirements, ROW exclusion areas, or management under a transportation plan. Any actions that limit the extent of surface disturbing activities would help reduce adverse impacts on surface water sources and recharge areas. Under this alternative, surface disturbance would be controlled within 500 feet to one-quarter mile of riparian areas, wetlands, and 100-year floodplains. Permanent facilities would not be constructed in 100-year floodplains, and linear ROWs would be identified and collocated as much as practicable. Defining the boundaries of groundwater recharge areas within the JMH CAP planning area would ensure that appropriate measures would be taken in these locations to protect groundwater quantity and quality.

It is assumed that the amount of mineral development that could occur during the planning period would be related to the amount of acreage available for such development. Therefore, reducing available acreage (i.e., closing areas to mineral exploration and development) would serve to diminish surface disturbance and consequently reduce adverse impacts on watershed resources and water quality. Impacts

on water resources from mineral development would be similar to but slightly less than those under the No Action Alternative, with development of 205 oil and gas wells (compared to 221 wells under the No Action Alternative). Although adverse impacts (exposed soils, erosion, and sedimentation) would be anticipated in localized areas, the health of watersheds would be used as an indicator in determining when to limit further development to ensure adverse impacts remained insignificant.

Impacts related to special management areas would be similar to those of Alternative 2, but not as great. Management actions associated with fewer designations and less expansion of special management areas under this alternative could result in fewer limitations and restrictions on surface disturbing activities.

4.4.2.6 Proposed JMH CAP

Fire could have both long-term beneficial and short-term adverse effects on water resources under this alternative, the degree of which would depend on fire size, timing, and fuel type. Adverse impacts could include increased runoff from exposed soils and sedimentation of surface waters. Over the long term, positive impacts could include increased age and species diversity of plant communities, enhanced nutrient cycling, and increased plant vigor, which would slow erosion rates and improve watershed health and water quality. Wildfires usually have more adverse impacts than do prescribed burns because wildfires generally cover larger areas and remove more vegetation, and, if burning outside established prescription, often burn with enough heat to adversely affect soil organisms and damage the root systems of some plants. This could result in long-term adverse impacts by compromising future plant rejuvenation and growth rates. Fire suppression activities could also result in adverse impacts through increased soil erosion resulting from fire line construction and heavy equipment transport. Prescribed fires generally result in long-term beneficial effects on watershed health and water quality. The significance of any impact would depend on the amount of area burned, fire type, proximity to a water source, amount of sedimentation, and rate of revegetation. The minimal extent of proposed prescribed burns (approximately 5,000 acres), and the requirements related to these activities under this alternative (e.g., post-treatment rest, mosaic patterns, and limiting suppression activities to existing roads and trails), would minimize short-term adverse impacts by limiting the amount of exposed ground susceptible to erosion. Full fire suppression would be applied to basin big sagebrush/lemon scurfpea vegetation associations, which stabilize the sand dunes and maintain the integrity and stability of the watershed in which they grow.

Riparian areas would be managed to attain PFC as the minimum acceptable level of ecological condition. This would have a beneficial impact on watershed resources and water quality by reducing erosion and sediment yield, promoting vegetative cover, stabilizing streambanks, and enhancing water quality. Watershed assessments, increased monitoring efforts, and implementation of mitigation measures would improve watersheds with sensitive baseline conditions, having a long-term beneficial impact on the resource. BLM would continue to participate with federal, state, and local government agencies to develop and implement salinity control plans for the basin and to maintain existing and future applicable water quality plans. Aquatic, wetland, and riparian habitat would not be disposed of unless exchanged for lands with equal or greater value (including monetary and functional resource values).

Livestock grazing could have localized impacts on watershed resources and water quality. Soil compaction and loss of vegetative cover could result in reduced soil infiltration and increased runoff and sedimentation of surface waters. Other potential adverse impacts from livestock grazing activities could include channel destabilization, nutrient loading of surface waters, and promotion of invasive plant species. In addition, surface alterations and water depletions resulting from development of livestock pits, ponds, and water wells could alter flow dynamics and cause overall degradation of the riparian corridor (see Appendix 3 and Section 4.4.6 for further details). Approximately 80 percent of the water used for livestock water developments would be from the Colorado River drainage, with the remaining

amount coming from the Platte River drainage. Using 5 acre-feet per water development over the 20-year planning period, average annual depletions anticipated from these actions would not exceed 4.75 acre-feet for the Colorado River system and 1 acre-foot for the Platte River system. Implementation of the Wyoming Standards for Healthy Rangelands and Guidelines for Livestock Grazing and the DPC objectives would help ensure proper management of livestock resources and reduce adverse impacts on watershed resources and water quality.

Certain requirements and mitigation measures for livestock grazing operations would further help minimize impacts. Livestock water developments and range improvements would be designed to improve resource conditions and livestock distribution. These activities generally distribute livestock within the pasture/allotment in an effort to prevent livestock concentration and overuse of forage. The immediate area surrounding water developments would generally be adversely affected because of construction disturbances and livestock concentrations around water developments. This would accelerate runoff and erosion within the affected area and could adversely impact nearby surface waters by increasing sediment and nutrient loads. With proper planning and effective management of range improvements, adverse impacts on water resources would be minimized to acceptable levels. Within sensitive wildlife habitat, livestock water developments would be allowed only if resource conditions were improved, which could benefit water resources through improved construction planning of such developments. Riparian exclosures would be constructed as needed to keep livestock out of sensitive riparian areas, thereby reducing impacts on watershed health and water quality. Prohibiting placement of salt and mineral supplements within 500 feet of riparian areas would help minimize soil compaction and subsequent runoff near surface waters.

Vegetation management activities would most likely result in beneficial impacts on watershed resources and water quality. The protections afforded to special status plant species and the management actions designed to achieve the DPC objectives would have a beneficial effect on watershed resources by maintaining plant diversity and preserving ecological conditions. Preventing and controlling the spread of invasive plant species would also improve watershed health by reducing competition with native plants and maintaining biodiversity. Vegetation manipulation to enhance wildlife habitat would have adverse short-term impacts on watershed resources by removing vegetation and consequently increasing erosion and sedimentation; however, long-term beneficial impacts could be realized by increasing age and species diversity of plant communities, enhancing nutrient cycling, and increasing plant vigor.

Long-term beneficial impacts on water resources are anticipated from wildlife habitat management activities. Actions to improve wildlife habitat generally involve the protection of water sources and the promotion of diverse plant communities, which are better able to slow and filter overland flow, reduce erosive forces, and improve water quality. Short-term adverse impacts could occur where wildlife populations concentrate near water sources, potentially increasing erosion and sediment loads. These beneficial impacts would likely increase over the No Action Alternative because of expanded protection measures for greater sage-grouse. Placing a controlled surface use stipulation on sage-grouse nesting habitat and increasing the amount of sage-grouse winter habitat would reduce the level of surface disturbing activities occurring in these areas, thereby reducing related erosion, runoff, and sedimentation of surface waters.

Management of heritage resources should have minimal impacts on watershed health and water quality. Management actions generally focus on the protection or preservation of heritage sites, which in turn benefit water resources by limiting or excluding surface disturbing activities on or near such sites. Data recovery excavations could adversely affect watershed resources via surface disturbances and vegetation removal if not properly conducted. Indirect effects could occur if avoidance of cultural sites directed activities to other areas, possibly concentrating uses and increasing adverse impacts on local watersheds. However, because of the limited activity allowed in proximity to water resources, any adverse impacts

would be insignificant. Protection measures afforded by the National Historic Preservation Act would further mitigate potential adverse impacts. Impacts on water sources near the paleosol deposition area would most likely be less extensive than under the No Action Alternative because of the management of this area as an archeological district. Such management would increase protection from surface disturbing activities, thereby reducing adverse impacts on nearby water sources.

Recreational activities that occur in proximity to water sources could impact watershed resources and water quality, but significant impacts are not anticipated. Camping and hiking adjacent to waterways could result in localized compaction of soils, vegetation removal, and streambank instability, which in turn could increase sediment, salt, and nutrient loads from increased runoff. Waste products from recreational activities near riparian areas could have localized adverse effects on aquatic resources. Although camping would be allowed in riparian corridors, areas would be closed if resource damage occurred, thereby preventing adverse impacts from becoming significant. Requiring that special recreation use permits be reviewed and recommendations made by the Rock Springs Field Office would ensure input from field office resource specialists before authorization of special recreation activities. This could reduce impacts on water resources, because such activities would be directed by the personnel most familiar with the planning area.

Use of OHVs could have an adverse impact on water resources, especially if OHVs were used in an unauthorized manner. Impacts could include erosion, soil compaction, and increased turbidity from unauthorized stream crossings and use of wetland meadows. OHV use limitations and visitor compliance with BLM's OHV designations would locally contain adverse impacts and help prevent degradation of sensitive watersheds. Implementation of educational programs such as the "Tread Lightly" program would further help to reduce adverse impacts on land and water resources.

Surface disturbing activities, such as those associated with the construction of linear ROWs for pipelines, transmission lines, and communication lines, and oil and gas development, including construction of well pads, mud pits, and roads, could impact water resources. Land clearing and grading activities necessary for construction would remove vegetation and compact soils, which would contribute to increased erosion and subsequent sedimentation of local surface waters. Water depletions from oil and gas drilling processes would reduce total volume of flows to the Colorado River and Platte River drainages (see Appendix 3 and Section 4.4.6 for further details). Approximately 95 percent of the water used for drilling would be from the Colorado River drainage (i.e., 95 percent of the wells would be within this watershed), with the remaining amount coming from the Platte River drainage. Using the assumption of 1.5 acre-feet of water per well, water depletion from these actions would total approximately 367.5 acre-feet in the Colorado River drainage and 15 acre-feet in the Platte River drainage. Based on a 20-year time frame, the average annual depletion for the Colorado River and the Platte River drainages would be 18.4 acre-feet and 0.75 acre-feet, respectively.

Implementation of standard practices and mitigation measures would help minimize long-term adverse impacts on water resources by stabilizing soil conditions and promoting revegetation of disturbed areas. Disturbed sites would be monitored for effective reclamation, and linear ROWs would avoid or be excluded from sensitive areas whenever possible. If sensitive areas could not be avoided, appropriate mitigation measures would be applied. Surface disturbance would be controlled within 500 feet of riparian areas, wetlands, and 100-year floodplains. Controlled use means that surface disturbing activities would avoid these areas unless a site-specific analysis determined that there would be no adverse impacts on water resources. Permanent facilities (other than linear facilities) would not be allowed in 100-year floodplains, or riparian or wetland areas, and linear ROWs would be identified and collocated as much as practicable. These limitations would ensure that any adverse impacts on water resources would not be significant. Some surface disturbing activities (e.g., reconstruction of crossing, road surfacing, gabions) could serve to maintain or improve water quality.

Impacts on water resources from oil and gas development would be similar to those under Alternative 3, with 1,675 acres of anticipated surface disturbance (Table A13-7) and development of 205 wells (Appendix 13). However, the strategy for implementing fluid mineral leasing decisions under this alternative (Appendix 17) could affect the degree of impact in certain areas. There would be no new oil and gas leasing in the majority of Area 3 (Figure A17-1), which could reduce impacts in this area over the long term. However, in the short term, this could result in more rapid exploration and development of existing leases in Area 3 because there would not be any opportunity to renew leases upon expiration. Moreover, given that much of this area is within the high development potential area (Map 69), successful well completion rates are expected to be high. These factors could result in a substantial increase in surface disturbance over a relatively short period of time, potentially increasing short-term impacts on water resources compared with Alternative 3.

Groundwater could be affected during construction of drill pads or by other exploration and development activities. Improper casing and cementing of wells, undetected spills, or leachate from produced water or mud pits could introduce contaminants into the groundwater. Chemicals used for production drilling could cause local contamination of soil and groundwater if not properly managed. Construction of drilling pads, proper disposal practices, proper casing and cementing, and recycling of drilling fluids would be in accordance with BLM guidelines and should minimize adverse effects on groundwater. Hydrological investigations would be conducted before coalbed gas development to determine whether any connection existed between surface waters and the aquifer that would be dewatered. Appropriate measures would be taken to prevent adverse impacts on water quality during dewatering. Dewatering during coalbed gas production could affect the quantity of groundwater by changing flow gradients. Given the present state and federal regulations regarding general water quality, as well as salinity and the Colorado River Basin, surface discharge of produced water is not anticipated. However, accidental surface discharges could adversely impact nearby surface water quality by increasing salinity levels. The extent of any impact would depend on the quality and quantity of the produced water and any fluids being released.

Irrigation diversions on private lands have a noticeable influence on channel dynamics and morphology. Pacific Creek, the primary stream system in the JMH CAP planning area, has been under the influence of irrigation diversions for close to 100 years. Irrigation diversions will most likely continue to be a noticeable influence in the future.

Management actions for special management areas and other management areas could maintain or improve water resources. Restrictions on development and other surface disturbing activities would help maintain or improve water sources and prevent accelerated erosion and sedimentation of surface waters. This beneficial impact would most likely be greater than under the No Action Alternative because of implementation of management actions associated with the expansion of Steamboat Mountain ACEC and management of the West Sand Dunes Archaeological District and Steamboat Mountain Management Area. This would increase the area subject to surface disturbance restrictions and limitations and thus limit potential adverse impacts resulting from exposed soils and subsequent erosion and surface runoff.

4.4.3 Potential Impacts on Wild Horses

BLM is responsible for protecting, managing, and controlling wild horses. The wild horse program is responsible for monitoring both the land and the herds, providing opportunities for public viewing, removing excess animals, and preparing animals for adoption. Impacts on resources and resource users resulting from implementation of wild horse management actions are discussed in those particular resource sections. This section describes potential impacts on wild horses resulting from the implementation of management actions for other resource management categories.

Adverse impacts on wild horses would be considered significant if available forage were insufficient to sustain the AML of the herd or if the AML could not be achieved or maintained.

For analysis purposes, it is assumed that the Divide Basin Wild Horse Herd would continue to be maintained at the AML of 415 to 600 horses over the long term through gathering efforts. It is also assumed that approximately 1 acre would be disturbed, and vegetation and forage removed, through construction and use of wild horse traps every 3 years for gathering.

4.4.3.1 Common to All Alternatives

Impacts on wild horses generally result from activities that affect forage levels, water sources, or allotted acreage within the HMA.

Both wildland fires and prescribed burns could have short-term adverse impacts on wild horses due to loss of forage resources. However, fire has the potential to improve the forage production capacity of a given area and to convert shrub habitat to grasslands. This would provide long-term benefits to wild horses by providing increased levels of preferred forage.

In general, watershed management activities would benefit wild horses by enhancing vegetation resources aimed at reducing erosion and improving water quality. Requiring PFC as the minimum acceptable level of ecological condition for all riparian habitats would maintain and improve the health of both upland and riparian vegetation, which would have the indirect effect of increasing forage levels available for wild horses. Riparian management exclosures could have minor adverse effects by excluding horses from water and forage.

Implementing wild horse management actions would have an overall benefit for wild horses. Achieving and maintaining the AML and implementing monitoring and gathering plans would serve to limit wild horse population numbers and achieve a balance among forage resources, other resource uses, and wild horse management. Establishing viewing sites and providing interpretive information on wild horses would serve to educate the public on the importance of appropriately managing the wild horse program. The impact of gathering activities on wild horses would be addressed during site-specific analyses.

Livestock grazing activities could benefit or adversely affect wild horses because the horses' forage preference overlaps with that of domestic livestock. However, because of the provisions and restrictions of grazing management actions, the overall effect would likely be beneficial. Implementation of the Wyoming Standards for Healthy Rangelands and Guidelines for Livestock Grazing would help ensure a healthy rangeland condition, thereby providing adequate forage levels for wild horses. Most range improvements or water developments designed to facilitate livestock management, with the exception of restrictive fencing, would also benefit wild horses and their management.

Vegetation management activities most likely would benefit wild horses and their habitat. Any actions designed to enhance vegetative conditions would indirectly benefit wild horses by enhancing and increasing forage production. Vegetation treatments and manipulation would have adverse, short-term impacts on wild horses through vegetation removal, but long-term benefits would be realized because of enhanced forage production. Preventing and controlling the spread of invasive plant species would also benefit wild horses by reducing competition with native plants, consequently maximizing forage production. Implementation of the Wyoming Standards for Healthy Rangelands would ensure that any impacts would not significantly impact wild horses or their habitat.

Management actions to improve habitat for wildlife, prevent habitat fragmentation, and provide protection from human activity would benefit wild horses by maintaining and improving forage production, reducing human disturbance, and enhancing habitat conditions.

Management of heritage resources generally would be low impact and limited to relatively small areas, and would not be anticipated to have measurable effects on wild horse forage. Even under the most intense management (i.e., excavation), the amount of acreage disturbed would likely be very small. The most likely adverse impact on wild horses would be temporary displacement while human activity occurred at a heritage site. Limitations on surface disturbing activities near heritage sites could benefit wild horses by protecting vegetation resources, which in turn could maintain or enhance forage conditions.

Recreational activities, such as camping and hiking, would not likely have any impact on wild horses. Some adverse impacts could result from the temporary removal of vegetation in concentrated areas used by special recreation groups, but such impacts would be negligible. The use of OHVs in designated areas and on existing roads and trails would not adversely affect wild horses because this activity would not affect any forage base; however, some temporary displacement of horses might occur.

Surface disturbing activities associated with the construction of linear ROWs for pipelines, transmission lines, communication lines, and roads, and oil and gas development, including construction of well pads, mud pits, and roads, could adversely impact wild horses. Land clearing and grading activities necessary for construction remove vegetation (i.e., result in loss of forage resources) and create disturbance by human activity. Standards for reclamation of linear surface disturbances would be adequate to mitigate any potential adverse impact on wild horses due to vegetation removal. Effects from most mineral development would be temporary, because the vegetative conditions on most sites would ultimately be reclaimed, and displacement from areas experiencing increased human activity related to mineral development is not anticipated to be long term.

The protections afforded to special management areas would generally result in beneficial impacts on wild horses. Protections aimed at conserving sensitive vegetation communities, and limitations on mineral development and other surface disturbing activities, would benefit wild horses by enhancing overall vegetation conditions and consequently increasing forage production. Restrictions on gathering of wild horses in these areas could have minor impacts on the wild horse program. Removing horses from these areas might require that horses be moved a greater distance to access available trap sites.

4.4.3.2 No Action Alternative

Implementing management prescriptions for watershed resources would generally result in beneficial impacts on wild horses. Managing wetlands in accordance with current laws, and limiting surface disturbance within 500 feet of riparian areas and floodplains, would aid in maintaining or improving forage conditions within these areas. Adverse impacts might result from maintaining and developing riparian exclosures, which would reduce the amount of available forage and limit access to water sources.

Wild horse management actions would result in impacts similar to those common to all alternatives. Further benefits could be realized by allowing construction of water developments designed to improve herd distribution and manage forage utilization. Maintaining the current HMA boundaries could adversely impact the management of wild horses. Currently wild horses are using habitat outside the established HMA boundary, and they will continue to do so. Total removal of these horses is not possible because other horses will move into the areas as horses are removed. These “outside area” wild horses do not count toward the AML for the Divide Basin Wild Horse HMA, and the need to remove them will continue.

Impacts on wild horses from livestock grazing activities would be similar to those common to all alternatives. Although livestock operators could increase AUM use to the fully permitted amount, anticipated use of AUMs would be similar to historic levels and would not result in any additional grazing pressure on available forage. Construction and maintenance of livestock range improvements and water developments would be designed to improve resource conditions and/or enhance livestock distribution. This would maintain healthy forage conditions, prevent overuse of vegetation resources, and ultimately benefit wild horses. Prohibiting placement of salt and mineral supplements within 500 feet of riparian areas would help ensure that water quality remained adequate for consumption by wild horses.

Impacts on wild horses from mineral development and other surface disturbances (e.g., ROWs) would include temporary displacement of wild horses and direct removal of forage. The majority of the Divide Basin Wild Horse HMA is currently open to mining claims, is under lease, or would be open to new oil and gas leases or linear ROWs for pipelines and communication and transmission lines. Construction of mining pits removes forage and habitat for wild horses, and dredging or placer mining affects water sources, all of which could have adverse impacts on the long-term viability of wild horse habitat. Oil and gas development potential within the HMA varies; thus, the amount of available forage that would be removed or disturbed would depend on the level of development that occurred within this area.

4.4.3.3 Alternative 1

Impacts resulting from management of wild horses would be the same as those under the No Action Alternative.

Watershed management actions would be less restrictive under this alternative, which could reduce or increase benefits to wild horses compared with the No Action Alternative. Reducing the avoidance area around riparian zones and floodplains to 250 feet would provide less protection to vegetation resources from surface disturbing activities and possibly result in degraded forage conditions. Removing riparian exclosures could benefit wild horses by increasing the amount of available forage in the short term.

Adverse impacts on wild horses resulting from livestock grazing management actions would increase compared with the No Action Alternative. The anticipated use of livestock AUMs would increase over the planning period to the permitted active use amount, which is approximately double the historic use. This would increase pressure on forage and water resources within allotments that were not currently using their fully permitted AUMs, thereby reducing the quantity and quality of forage available to wild horses. Moreover, less restrictive measures for range improvements, water developments, and salt placement could limit protections to forage and surface water resources. The level of significance of the adverse impacts on wild horses would depend on the overall condition of the range within the HMA and the actual increase in AUM usage. The implementation of the Wyoming Standards for Healthy Rangelands and Guidelines for Livestock Grazing would help minimize adverse impacts on forage and water resources.

Benefits from wildlife management would be less extensive than under the other alternatives because of less restrictive actions to protect wildlife habitat.

This alternative would provide the greatest opportunity for mineral development, which would increase the potential for impacts related to forage removal. The majority of the Divide Basin Wild Horse HMA would be open to mining claims, under lease, or open to new leases for oil and gas or linear ROWs. Development potential within the HMA varies; thus, the amount of available forage that would be removed or disturbed would depend on the level of development that occurred within this area. The level of development would likely be greater under this alternative because of fewer limitations imposed on developers; thus, an adverse impact on wild horses could result if development outpaced reclamation and

replacement of habitat. This could also have indirect adverse impacts if wild horses were displaced elsewhere for long periods of time.

4.4.3.4 Alternative 2

This alternative would reestablish the boundaries of the Divide Basin Wild Horse HMA to exclude the JMH CAP planning area. A gathering plan would be developed and implemented to remove wild horses from the planning area and maintain the AML within the reestablished boundaries of the HMA outside the planning area. Until reestablishment of the HMA boundaries and gathering of excess wild horses occurred, management actions associated with other land and water resources would generally have beneficial impacts on wild horses because of increased protection of forage and water resources. The potential could exist for adverse cumulative impacts in the reestablished HMA outside the planning area if the concentration of wild horses in a smaller area caused overuse of available forage and water resources.

Wild horses currently exist in favorable habitats outside the existing HMA boundary. The only way to ensure that the horses would not stray from the reestablished HMA would be to create a barrier to their movement. This would require the construction of more than 30 miles of fence, which could impact the wild and free roaming nature of the herd.

4.4.3.5 Alternative 3

Impacts resulting from management of livestock would be the same as those under the No Action Alternative.

This alternative would expand the Divide Basin Wild Horse HMA to include the entire JMH CAP planning area. This would have an overall beneficial impact by improving wild horse management and providing additional habitat for wild horses. The horses currently outside the HMA would be counted against the AML for the HMA, which at present is not the case. These “outside area” horses would gain legal status and would no longer be considered outside-HMA animals. Replacement of removed horses by other animals would not re-create the outside-HMA situation. No barrier would need to be constructed to limit wild horse use to the present HMA boundary (No Action, Alternative 1) or a reduced HMA boundary (Alternative 2). Increased flexibility in where to remove horses within a much larger area would allow for more responsiveness to site-specific needs. For example, more horses could be removed from the areas within the existing HMA boundary because the horses in the expansion area would count toward the AML.

Management actions to improve habitat for wildlife, prevent habitat fragmentation, and provide protection from human activity would benefit wild horses by maintaining and improving forage production and habitat conditions. These beneficial impacts could be slightly greater than under the No Action Alternative because of expanded protection measures for greater sage-grouse. Increasing the amount of sage-grouse winter habitat would reduce surface disturbing and disruptive activities within this area, thereby reducing related forage removal and horse displacement.

Impacts on wild horses from mineral development and other surface disturbances (e.g., ROWs) would include temporary displacement of wild horses and direct removal of forage. The majority of the Divide Basin Wild Horse HMA would be open to mining claims, under lease, or open to new oil and gas leases or linear ROWs for pipelines and communication and transmission lines. Construction of mining pits removes forage and habitat for wild horses, and dredging or placer mining affects water sources, all of which could have adverse impacts on the long-term viability of wild horse habitat. Oil and gas development potential within the HMA varies; thus, the amount of available forage that would be

removed or disturbed would depend on the level of development within this area. Impacts would be similar to, but slightly less than, under the No Action Alternative, with 1,675 acres of anticipated surface disturbance (Table A13-7) and development of 205 oil and gas wells (Appendix 13).

Any actions that limited the extent of surface disturbing activities would help minimize adverse impacts on available forage and water sources, having a beneficial impact on wild horses. Under this alternative, a greater amount of land area would be subject to controlled surface use requirements or ROW exclusion, withdrawn from mineral location, or managed under a transportation plan. Surface disturbing activities would be controlled within 500 feet to one-quarter mile of riparian areas, wetlands, and 100-year floodplains, but parameters could vary on a case-by-case basis.

Management actions related to special management areas under this alternative could result in slightly greater beneficial impacts on wild horses than under the No Action Alternative. Implementation of management actions associated with the expansion of existing ACECs would increase the area subject to surface disturbance restrictions and limitations and thus protect available forage and water sources.

4.4.3.6 Proposed JMH CAP

Both wildland fires and prescribed burns could have short-term adverse impacts on wild horses due to loss of forage resources. However, fire has the potential to improve the forage production capacity of a given area and to convert shrub habitat to grasslands. This would provide long-term benefits to wild horses by providing increased levels of preferred forage.

In general, watershed management activities would benefit wild horses through enhancement of vegetation resources aimed at reducing erosion and improving water quality. Requiring PFC as the minimum acceptable level of ecological condition for all riparian habitats would maintain and improve the health of both upland and riparian vegetation, which would have the indirect effect of increasing forage levels available for wild horses. Managing wetlands in accordance with current laws, and limiting surface disturbance within 500 feet of riparian areas and floodplains, would further aid in maintaining or improving forage conditions within these areas. Riparian management exclosures could have short-term adverse effects by excluding horses from water and forage. Over the long term, such exclosures would benefit wild horses by improving water quality and riparian forage conditions. However, the provision under this alternative that allows exclosures to be removed could partially offset these impacts.

Implementing wild horse management actions would have an overall benefit for wild horses. Maintaining the AML and implementing monitoring and gathering plans would serve to limit wild horse population numbers and achieve a balance among forage resources, other resource uses, and wild horse management. The impact of gathering activities on wild horses would be addressed during site-specific analyses. Establishing viewing sites and providing interpretive information on wild horses would serve to educate the public on the importance of appropriately managing the wild horse program. However, maintaining the current HMA boundaries as specified under this alternative could adversely impact the management of wild horses. Currently wild horses are using habitat outside the established HMA boundary, and they will continue to do so. Total removal of these horses is not possible because other horses will move into these areas as horses are removed. These “outside area” wild horses will not count toward the AML for the Divide Basin Wild Horse HMA, and the need to completely remove them will continue.

Livestock grazing activities could benefit or adversely affect wild horses because the horses’ forage preference overlaps with that of domestic livestock. However, because of the requirements and restrictions associated with grazing management actions, overall effects would likely be beneficial. Implementation of the Wyoming Standards for Healthy Rangelands and Guidelines for Livestock Grazing would help ensure a healthy rangeland condition, thereby providing adequate forage levels for wild

horses. Although livestock operators could increase AUM use to the fully permitted amount, anticipated use of AUMs would be similar to historic levels and would not result in any additional grazing pressure on available forage. The construction and maintenance of livestock range improvements and water developments would be designed to improve resource conditions and/or enhance livestock distribution. This would maintain healthy forage conditions, prevent overuse of vegetation resources, and ultimately benefit wild horses. Within sensitive wildlife habitat, livestock water developments would be allowed only if resource conditions were improved. This could further benefit wild horse habitat through improved construction planning of such developments. Prohibiting placement of salt and mineral supplements within 500 feet of riparian areas would help ensure that water quality remained adequate for consumption by wild horses.

Vegetation management activities would most likely benefit wild horses and their habitat. Any actions designed to enhance vegetative conditions would indirectly benefit wild horses by enhancing and increasing forage production. Vegetation treatments and manipulation would cause adverse short-term impacts on wild horses through vegetation removal, but long-term benefits would be realized because of enhanced forage production. Preventing and controlling the spread of invasive plant species would also benefit wild horses by reducing competition with native plants, consequently maximizing forage production. Implementation of the Wyoming Standards for Healthy Rangelands would ensure that any impacts did not significantly impact wild horses or their habitat.

Management actions to improve habitat for wildlife, prevent habitat fragmentation, and provide protection from human activity would benefit wild horses by maintaining and improving forage production, reducing human disturbance, and enhancing habitat conditions. These beneficial impacts could be greater than under the No Action Alternative because of expanded protection measures for greater sage-grouse. Placing a controlled surface use stipulation on sage-grouse nesting habitat and increasing the amount of sage-grouse winter habitat subject to seasonal limitations would reduce the level of surface disturbing activities occurring in these areas, thereby reducing related forage removal and wild horse displacement. Recreational activities such as camping and hiking would not likely have any impact on wild horses. Some adverse impacts could result from the temporary removal of vegetation in concentrated areas used by special recreation groups, but such impacts would be negligible. The use of OHVs in designated areas and on existing roads and trails would not adversely impact wild horses because this activity would not affect the overall forage base; however, some temporary displacement could occur.

The management of heritage resources generally would be low impact and limited to relatively small areas, and would not be anticipated to have measurable effects on wild horse forage. Even under the most intense management (i.e., excavation), the amount of acreage disturbed would likely be very small. The most likely adverse impact on wild horses would be temporary displacement while human activity occurred at the heritage site. Limitations on surface disturbing activities near heritage sites could benefit wild horses by protecting vegetation resources, which in turn could maintain or enhance forage conditions. Impacts on vegetation resources near the paleosol deposition area would most likely be less extensive than those under the No Action Alternative because of designation of this area as an archeological district. This designation would increase protections from surface disturbing activities, thereby reducing adverse impacts on forage resources.

Surface disturbing activities associated with the construction of linear ROWs for pipelines, transmission lines, communication lines, and roads, and oil and gas development, including construction of well pads, mud pits, and roads, could adversely impact wild horses. Land clearing and grading activities necessary for construction remove vegetation, resulting in loss of forage resources, and create disturbance by human activity. Standards for reclamation of linear surface disturbances would mitigate potential adverse impacts on wild horses due to vegetation removal. Effects from most mineral development would be temporary because the vegetative conditions of most sites ultimately would be reclaimed, and

displacement from areas experiencing increased human activity related to mineral development is not anticipated to be long term. Construction of mining pits removes forage and habitat for wild horses, and dredging or placer mining affects water sources, all of which could have adverse impacts on the long-term viability of wild horse habitat.

Oil and gas development potential within the HMA varies; thus, the amount of available forage that would be removed or disturbed would depend on the level of development within this area. Impacts on wild horses would likely be similar to those under Alternative 3, with development of 205 wells (Appendix 13). However, the strategy for implementing fluid mineral leasing decisions under this alternative (Appendix 17) could affect the degree of impact in certain areas. There would be no new oil and gas leasing in the majority of Area 3 (Figure A17-1), which could reduce impacts in this area over the long term. However, in the short term, this could result in more rapid exploration and development of existing leases in Area 3 because there would not be any opportunity to renew leases upon expiration. Moreover, given that much of this area is within the high development potential area (Map 69), successful well completion rates are expected to be high. These factors could result in the removal of a substantial amount of forage over a relatively short period of time, potentially increasing short-term impacts on wild horses compared with Alternative 3.

Management actions for special management areas and other management areas would generally result in beneficial impacts on wild horses. Protections aimed at conserving sensitive vegetation communities and limitations on mineral development and other surface disturbing activities would benefit wild horses by enhancing overall vegetation conditions and consequently increasing forage production. Restrictions on gathering of wild horses in these areas could have minor impacts on the wild horse program. Removing horses from these areas might require that horses be moved a greater distance to access available trap sites. These impacts would be greater than under the No Action Alternative because of implementation of management actions associated with the expansion of Steamboat Mountain ACEC and management of the West Sand Dunes Archaeological District and Steamboat Mountain Management Area.

4.4.4 Potential Impacts on Livestock Grazing

BLM identifies lands available for livestock grazing, implements grazing management practices, and authorizes permitted use for maintaining ecological balance and multiple use relationships. Livestock grazing is not a natural, physical, or biological resource but is a user of those resources. Impacts on resources and resource users resulting from implementation of the livestock grazing management actions are discussed in those particular resource sections. This section describes potential impacts on livestock grazing operations resulting from the implementation of management actions for other resource management categories. Implementing resource management actions would have environmental impacts on livestock grazing activities and indirect, nonenvironmental impacts on livestock operators.

Impacts on livestock grazing would be considered significant if resource management actions caused a reduction in forage levels that would require livestock operators to reduce their permitted AUMs.

For analysis purposes, it is assumed that livestock grazing would occur throughout the entire JMH CAP planning area. It is also assumed that anticipated grazing use would increase over the planning period to the fully permitted active use amount (26,830 AUMs) under Alternative 1 but maintain the historic use (11,569 AUMs) under all other alternatives. Although some areas are more suitable for different classes of livestock, the impacts are assumed to be similar for all areas and therefore are not discussed separately. The rate of revegetation of disturbed areas would vary by type of activity. Construction of fences, pipelines, water wells, troughs, and reservoirs would cause a loss of some soil and vegetation. Vegetation would be reestablished along fences and pipelines within 3 to 5 years, whereas water wells, troughs, and reservoirs would remain disturbed during their useful life and would be revegetated upon abandonment.

Except under Alternative 2, approximately 23 livestock water developments (e.g., pits, ponds, and water wells) would be constructed or rebuilt in the JMH CAP planning area over the 20-year planning period, disturbing approximately 23 acres. Under Alternative 2, only 11 livestock water developments would be constructed or rebuilt in the JMH CAP planning area over the 20-year planning period, disturbing approximately 11 acres. Prescribed burns and wildfires would cause a loss of vegetation for a period of 1 to 2 years and a change in vegetation for 15 to 30 years.

4.4.4.1 Common to All Alternatives

Impacts on livestock grazing activities are generally the result of activities that affect forage levels or allowable AUMs for individual grazing allotments. Grazing management practices and permitted use must achieve the desired outcomes outlined in the Wyoming Standards for Healthy Rangelands.

Both wildland and prescribed fires would have short-term impacts on livestock grazing due to loss of forage resources. However, over the long term, fire has the potential to improve forage production capacity and convert shrub habitat to grasslands. This would benefit livestock by providing increased levels of preferred forage. The requirement to rest a burn area to allow new vegetation to establish could have a short-term impact on livestock operators because the amount of available forage would be reduced for the localized area of the burn. The level of significance of this impact would depend on the extent of the burn area and the season of use.

Watershed management would enhance vegetation resources by reducing erosion and improving water quality. Requiring PFC as the minimum acceptable level of ecological condition for riparian areas would maintain and improve the health of riparian vegetation, which would have the indirect effect of increasing forage levels for livestock. However, short-term adverse impacts on operators could result from construction of riparian exclosures or the need to remove livestock from allotments and/or pastures to achieve healthy rangeland standards.

Implementation of livestock grazing management actions could have both beneficial and adverse impacts on livestock operators. Most impacts would result from the need to make grazing adjustments for the purposes of complying with the Wyoming Standards for Healthy Rangelands. Such adjustments could include modified turnout dates, shorter grazing periods, growing season rest, riparian exclosures, forage utilization levels, and livestock conversions. Although these adjustments would benefit long-term forage production and subsequently livestock growth rates, adverse impacts on livestock operators could occur in the short term. The extent of any impact on livestock grazing operations would depend on the flexibility of the individual operator to implement and respond to these adjustments.

Livestock water developments would provide additional watering sites, thereby improving livestock distribution and reducing competition with other grazing animals. Restrictions on salt and mineral placement could require additional planning and effort but would distribute forage use and reduce impacts on other resources, including water sources. Livestock grazing management would benefit from enhanced distribution of livestock and the maintenance or improvement of vegetation. This would increase available forage and help achieve the Wyoming Standards for Healthy Rangelands.

Vegetation management activities would most likely result in beneficial impacts on livestock grazing management. Any actions designed to enhance vegetative conditions would indirectly benefit livestock by enhancing and increasing forage production. Vegetation treatments and manipulation could have short-term effects on livestock grazing through vegetation removal, but long-term benefits would be realized through enhanced forage production. Preventing and controlling the spread of invasive plant species would also benefit livestock by reducing competition with native plants, and consequently maintaining or improving forage production.

Activities associated with wildlife habitat management would generally benefit livestock grazing operations through habitat enhancement measures that consequently improve forage production. However, adverse effects could also result because of the inherent competition between big game species and livestock for forage resources. Because of dietary preference, this competition is more pronounced with elk than with antelope or mule deer. Similar to livestock, elk are considered grazers that prefer grasses, whereas the preference for mule deer and antelope is to browse shrub species. Large concentrations of these big game animals occur within portions of the planning area (Map 51), which could require some livestock operators to alter grazing management practices to comply with the Wyoming Standards for Healthy Rangelands. Uneven distribution of big game causes some grazing allotments to receive a disproportionate amount of the total wildlife grazing within the planning area, thereby putting additional strain on the forage resources within those allotments. This is especially true for allotments located either entirely or partially within the south-central portion of the planning area, including the core area, which is birthing and wintering habitat for a majority of the big game populations that inhabit the planning area. Although the population objective for elk would vary between the No Action Alternative (500) and the action alternatives (1,200), impacts on allotments located within the south-central portion of the planning area would remain approximately the same among the alternatives regardless of the changes in the population objective because of the expectation that the elk population size in this area would not change considerably. Achieving wildlife population objectives and implementing the various management options available to livestock operators would help minimize effects. Further effects could occur if management actions resulted in increased wildlife populations, which could reduce available forage for livestock. It is unlikely that this would occur, because of Wyoming Game and Fish Department (WGFD) efforts to maintain objectives.

The management of heritage sites would generally be limited to relatively small areas. Even under the most intense management (i.e., excavation), the amount of acreage disturbed would be very small. These activities are not anticipated to have measurable impacts on livestock forage resources. Impacts could occur if heritage sites were fenced from livestock use, causing a loss of available forage. However, given the size of most heritage sites, this impact would be minimal. Other impacts could occur because of restrictions on surface disturbing activities near heritage sites, which might preclude the construction of range improvements designed to facilitate livestock grazing. Conversely, such restrictions would provide protection to vegetation resources, which in turn could maintain or enhance forage conditions.

Recreational activities would likely not impact livestock grazing activities, except by limited human disturbance. Some impacts could result from the temporary removal of vegetation by campers in concentrated areas, but any impact would be negligible. The use of OHVs would not impact livestock if this recreational activity stayed within authorized areas. However, unauthorized OHV activity could affect livestock grazing by damaging vegetation resources and consequently reducing available forage.

Surface disturbing activities associated with the construction of linear ROWs for pipelines, transmission lines, communication lines, and roads, and mineral development, including construction of well pads, pits, and roads, could impact livestock grazing. Land clearing and grading activities necessary for construction remove vegetation, resulting in loss of forage resources. Standards for reclamation of linear surface disturbances would be adequate to mitigate adverse impacts related to short-term vegetation removal. Effects from most mineral development would be short-term because the vegetation conditions on most sites would ultimately be reclaimed. Salable mineral activity would not be expected to have measurable effects on livestock grazing management because of the limited activity anticipated and the limited area of vegetation removal. Any mineral withdrawals would prevent vegetation removal and the potential subsequent decrease in the forage base.

Management actions for special management areas could have both beneficial and adverse impacts on livestock grazing activities. Restrictions on mineral development and other surface disturbing activities

would help prevent the removal of forage resources but could also preclude the construction of range improvements designed to facilitate livestock grazing. In addition, protections aimed at conserving sensitive vegetation communities would affect livestock grazing by enhancing overall vegetation conditions and consequently increasing forage production.

4.4.4.2 No Action Alternative

Effects from fire management activities on livestock grazing would be similar to the impacts common to all alternatives. Implementing full fire suppression for basin big sagebrush/lemon scurfpea vegetation associations under this alternative could result in short-term impacts on livestock grazing through vegetation removal and loss of plant diversity. This vegetation association stabilizes the sandy soils in which it grows and provides habitat and forage, primarily for wildlife. Because of the relatively limited extent of these vegetation associations, impacts on livestock grazing would not be significant.

Effects from watershed management actions would be similar to the impacts common to all alternatives. Surface disturbance would be limited within 500 feet of riparian areas and other water resources, conserving forage resources within these areas. However, this could preclude the construction of water developments and range improvements in these areas (unless any impacts on water quality could be mitigated). Riparian exclosures could also affect grazing activities by reducing the amount of available forage for livestock because the exclosures would remain closed to grazing. The extent of this effect on livestock operators would depend on the number, location, and size of exclosures at any given time.

Wild horse management activities could affect livestock grazing through competition for forage resources. However, maintaining the AML for horses, implementing monitoring and gathering plans, and allowing for water developments would all serve to limit and distribute wild horses, consequently minimizing effects on livestock grazing.

Management actions for livestock grazing would directly affect grazing operations. Although livestock operators could increase AUM use to the fully permitted amount, anticipated use of AUMs would be similar to historic levels under this alternative and would not result in any additional grazing pressure on available forage. Requiring that livestock range improvements and water developments improve resource conditions and/or enhance livestock distribution could necessitate additional planning in constructing such developments but would improve long-term forage production and prevent overuse of vegetation resources. Similarly, more planning and effort might be required of livestock operators to comply with the requirements for placement of salt and mineral supplements (prohibited within 500 feet of riparian habitat, historic trails, and special status species habitat), but long-term benefits would be realized by improving livestock distribution and maintaining the Wyoming Standards for Healthy Rangelands.

Wildlife management effects on livestock grazing would be similar to the impacts common to all alternatives. Competition between big game and livestock for forage resources would be the least intense under this alternative because the population objective for elk would remain at the current level of 500, which could result in slightly less adverse impacts compared with the other alternatives.

Approximately 9,346 AUMs within the JMH CAP planning area (see Table 4-11 at the end of Chapter 4) would be necessary to support the WGFD herd unit population objectives for elk (500), mule deer (4,000), antelope (6,000), and wild horses (415–600). Estimates of AUMs were based on animal unit equivalents (AUE) specified in the Draft Environmental Impact Statement for the Proposed Grazing Management Program for the Salt Wells-Pilot Butte Area, 1983. This use, combined with the anticipated use of 11,569 AUMs for livestock, could degrade forage resources on some allotments and thus jeopardize compliance with the Wyoming Standards for Healthy Rangelands. This could result in the need to make grazing adjustments and to implement appropriate actions to comply with the standards.

Impacts from mineral exploration and development and from other surface disturbances in support of these activities (e.g., ROWs) would include removal of vegetation and consequently a reduction in available forage for livestock. It is assumed that the amount of mineral development that could occur during the planning period would be related to the amount of acreage available for such development. Therefore, reducing available acreage (i.e., closing areas to, or withdrawing areas from, mineral development) would serve to diminish development activity and consequently reduce impacts on livestock grazing. The amount of surface disturbance associated with mineral development would be approximately 200 acres in the most active year and approximately 1,800 acres over the planning period (Appendix 13, Table A13-7), which would represent an insignificant impact on livestock grazing when compared to the size of the planning area. Standards for reclamation of linear surface disturbances would help mitigate impacts related to vegetation removal.

4.4.4.3 Alternative 1

Impacts on livestock grazing from the fire management program and wild horses would be the same as those under the No Action Alternative.

Watershed management actions would be less restrictive under this alternative, which could create short-term benefits for and long-term adverse impacts on livestock grazing activities. Reducing the avoidance area around riparian areas and floodplains to 250 feet would provide less protection to forage resources from surface disturbing activities but would allow for greater flexibility in constructing water developments and range improvements. Allowing the removal of riparian exclosures under this alternative would increase available forage for livestock but would eliminate related benefits to riparian vegetation.

Livestock grazing management actions under this alternative would generally benefit operators by allowing increased flexibility in managing livestock. Less restrictive measures for range improvements, water developments, and salt and mineral placement could create short-term benefits for livestock operators but would limit protections to forage and surface water resources. The anticipated use of livestock AUMs would increase over the planning period to the permitted active use amount, further increasing grazing pressure on forage and water resources. Increased grazing and reduced resource protections could result in significant impacts on livestock grazing activities if operators were required to reduce their AUMs to comply with the Wyoming Standards for Healthy Rangelands.

Beneficial impacts resulting from wildlife management actions might not be as extensive as under the other alternatives because actions to improve wildlife habitat (which would also benefit livestock grazing) would be less restrictive. Animal damage control activities under this alternative could directly benefit livestock. The control methods would be coordinated with BLM.

Competition between big game and livestock for forage resources would be the most intense under this alternative, primarily because the anticipated use of livestock AUMs would increase over the planning period to the fully permitted active use amount. In addition, the elk population objective would be increased to 1,200, which could slightly increase the competition between livestock and wildlife for forage resources. An additional 1,513 AUMs would be required to support the augmented elk population objective, which is insignificant when compared to the available forage of the total planning area. Allotments located within the south-central portion of the planning area, including the core area, would be disproportionately impacted because of the larger populations of big game that inhabit this area (Map 51).

Approximately 10,860 AUMs within the JMH CAP planning area (see Table 4-11 at the end of Chapter 4) would be necessary to support the WGFD herd unit population objectives for elk (1,200), mule deer (4,000), antelope (6,000), and wild horses (415–600). Estimates of AUMs were based on AUEs specified

in the Draft Environmental Impact Statement for the Proposed Grazing Management Program for the Salt Wells-Pilot Butte Area, 1983. Utilizing the 26,830 AUMs permitted for livestock, coupled with wildlife use levels, could degrade forage resources on some allotments and thus jeopardize compliance with the Wyoming Standards for Healthy Rangelands. This could result in significant impacts on some operators if they were required to reduce their AUMs. Implementing appropriate actions for livestock grazing management might be necessary. Such actions could include, but would not be limited to, reduction of permitted AUMs, modified turnout dates, construction of livestock water developments and range improvements, shorter grazing periods, growing season rest, development of riparian pastures and exclosures, implementation of forage utilization levels, and livestock conversions. For some allotments, reallocation of AUMs among livestock, wildlife, and wild horses could be required to ensure that adequate forage would be available for big game. This would likely result in a reduction of AUMs for livestock but would not be implemented unless it were the only appropriate action for complying with the Wyoming Standards for Healthy Rangelands.

This alternative provides the greatest opportunity for mineral development and production, which would result in greater losses of forage resources. The land area available for lease and mining claims would be most extensive under this alternative; thus, the potential for mineral development would likely increase. This could result in greater surface disturbance, which could affect livestock grazing by removing available forage. The amount of surface disturbance associated with mineral development would be approximately 220 acres in the most active year and approximately 2,100 acres over the planning period (Appendix 13, Table A13-7), which would represent an insignificant impact on livestock grazing when compared to the size of the planning area. Reclamation of linear surface disturbances would help mitigate adverse impacts related to vegetation removal. Effects from most mineral development would be temporary because the vegetation conditions on most sites would ultimately be reclaimed. However, an adverse impact on grazing could result if development outpaced reclamation and replacement of forage.

Management activities related to special management areas could reduce both beneficial and adverse effects on livestock grazing by eliminating management actions associated with the removal of the ACEC designation from Steamboat Mountain ACEC and the reduction of the South Pass Historic Landscape viewshed. This would reduce the area subject to surface disturbance restrictions and limitations, which could reduce protections to forage resources but provide greater flexibility in constructing range improvements within these areas.

4.4.4.4 Alternative 2

Fire management actions would have effects on livestock grazing similar to those under the No Action Alternative. Limited fire suppression for basin big sagebrush/lemon scurfpea vegetation associations would be applied, but any effect on grazing would not be significant.

Watershed management actions would be the most restrictive under this alternative. This would benefit forage conditions but could affect some grazing management activities. Although increasing buffers to one-quarter mile around riparian areas and increasing the area designated as avoidance or NSO would help prevent destruction of vegetation resources, it would also preclude construction of water developments and range improvements designed to facilitate livestock grazing operations. Riparian exclosures would also impact grazing activities by reducing the amount of available forage for livestock because the exclosures would be closed to grazing. The extent of this impact on livestock operators would depend on the number, location, and size of exclosures at any given time during the planning period.

This alternative would reestablish the boundaries of the Divide Basin Wild Horse HMA to exclude the JMH CAP planning area. A gathering plan would be developed and implemented to remove wild horses

from the planning area and to maintain the AML within the reestablished boundaries of the HMA outside the planning area. This would likely affect livestock grazing by reducing competition with wild horses for forage and water resources. Certain allotments would be subdivided by construction of a fence designed to limit wild horse movement to the reestablished HMA boundary. Adverse impacts could occur from limiting livestock use within allotments affected by wild horse fence construction.

The increased restrictions on livestock grazing activities under this alternative would likely have greater adverse effects on livestock operators than would occur under the other alternatives. Although livestock operators could increase AUM use to the fully permitted amount, anticipated use of AUMs would be similar to historic levels. Requiring that modified turnout dates be the primary method of complying with the Wyoming Standards for Healthy Rangelands could increase costs for livestock operators who would be forced to find alternate pastures or feeding areas for their livestock. Increasing the buffer area for salt and mineral placement to one-half mile from riparian areas, historic trails, and special status plant species would require more planning and effort on the part of livestock operators and could increase related costs. Whether the minimum one-half-mile distance would provide greater protection to these areas than would some shorter distance would depend on the topography, drainage patterns, and vegetative cover at a particular location. Restrictions on water developments and range improvements in sensitive wildlife habitats might preclude their construction in some cases, thereby reducing the extent of forage and water accessible by livestock.

Management actions for wildlife under this alternative would likely have greater beneficial effects on livestock grazing due to expanded protection and enhancement measures for wildlife resources that would limit surface disturbance and human disruption and improve forage conditions. However, these actions could also increase wildlife populations, potentially reducing available forage for livestock. Such impacts would occur only if WGFD efforts to maintain wildlife population objectives were not successful. Adverse impacts could be slightly greater than under the No Action Alternative because the elk population objective would be increased to 1,200. This would require an increase of 1,513 AUMs for elk, which is insignificant when compared to the available forage of the total planning area. Animal damage control for livestock protection would be by nonlethal methods, with lethal methods used only if they would benefit wildlife in addition to livestock. This could affect livestock operations if removing animals known to have killed livestock proved to be not as efficient as the methods employed under other alternatives.

Approximately 8,742 AUMs within the JMH CAP planning area (see Table 4-11 at the end of Chapter 4) would be necessary to support the WGFD herd unit population objectives for elk (1,200), mule deer (4,000), and antelope (6,000). Estimates of AUMs were based on AUEs specified in the Draft Environmental Impact Statement for the Proposed Grazing Management Program for the Salt Wells-Pilot Butte Area, 1983. This use, combined with the anticipated use of 11,569 AUMs for livestock, could degrade forage resources on some allotments and thus jeopardize compliance with the "Wyoming Standards for Healthy Rangelands." This could result in the need to make grazing adjustments and implement appropriate actions to comply with the standards.

Increased protection would be afforded to heritage resources under this alternative, which could have both greater beneficial and adverse impacts on livestock grazing than would occur under the other alternatives. Areas within 300 feet of sites eligible for inclusion in the NRHP would be protected from surface disturbing activities, which could help protect forage resources. However, this limitation could also further restrict the construction of range improvements and water developments within the same area.

Management prescriptions for recreational activities under this alternative would likely reduce related impacts. Camping would be allowed only in designated areas, and parties of five or more would require a group camping permit. This would help in monitoring concentration of use, limit camping along streams,

and reduce compaction of vegetation and soils. The amount of area closed to OHV use or subject to OHV use restrictions would increase, thereby reducing the potential for damage to forage resources. Withdrawing the planning area from recreational mining use would eliminate related surface disturbance and forage losses. However, it is not anticipated that this activity would disturb a significant area of available forage.

This alternative provides the least opportunity for mineral exploration and development, which would minimize related losses of forage resources. The amount of surface disturbance associated with mineral development would be approximately 170 acres in the most active year and approximately 1,300 acres over the planning period (Appendix 13, Table A13-7), which would represent an insignificant impact on livestock grazing when compared to the size of the planning area. Effects from most mineral development would be temporary because the vegetation conditions on most sites would ultimately be reclaimed. However, an effect on grazing could result if development outpaced reclamation and replacement of forage.

Impacts on livestock grazing by actions related to special management areas would be greater under this alternative than under other alternatives. Management actions associated with expansion of existing ACECs and historic viewsheds and designation of new ACECs and research natural areas would increase the amount of area subject to surface disturbance restrictions and limitations and thereby increase protections to forage resources. However, such expansions and designations would also further limit construction of water developments and range improvements, potentially affecting livestock operations.

4.4.4.5 Alternative 3

Impacts on livestock grazing from the fire management program would be the same as those under the No Action Alternative.

Watershed management actions under this alternative would have effects on livestock grazing similar to those under the No Action Alternative. Surface disturbance would be limited within 500 feet to one-quarter mile of riparian areas and other water resources, which could adversely impact livestock grazing management by precluding the construction of water developments and range improvements in these areas. However, this limitation could also conserve forage resources within these areas. Riparian exclosures could also impact grazing activities by reducing the amount of available forage for livestock because the exclosures would be closed to grazing.

This alternative would expand the boundaries of the Divide Basin Wild Horse HMA to include the entire JMH CAP planning area and would serve to better distribute wild horses, possibly reducing the competition between livestock and wild horses for forage resources. Because wild horses currently inhabit areas outside the HMA boundaries, the likelihood of reduced effects would not be realized in the short term until herd levels reached and maintained the AML.

Livestock grazing management actions under this alternative would affect livestock operators in ways similar to those under the No Action Alternative. Although livestock operators could increase AUM use to the fully permitted amount, anticipated use of AUMs would be similar to historic levels and would not result in any additional grazing pressure on available forage. Construction and maintenance of livestock range improvements and water developments would be designed to improve resource conditions and/or enhance livestock distribution. This would maintain healthy forage conditions and prevent overuse of vegetation resources. Prohibiting salt and mineral supplements within one-quarter mile of riparian areas, historic trails, and special status plant species would improve livestock distribution and help maintain water quality. The effectiveness of the increased distance would depend on the size and type of the activity and the topography and drainage patterns of the activity location.

Under this alternative, management actions for wildlife would have impacts on livestock grazing similar to those of Alternative 2 but not as extensive. Expanded protection and enhancement measures for wildlife resources would limit surface disturbance and improve forage conditions but could also increase wildlife populations, thereby potentially reducing available forage for livestock. WGFD efforts to maintain wildlife population objectives should prevent this effect. Overall adverse impacts on livestock grazing could be slightly greater than under the No Action Alternative because the elk population objective would be increased to 1,200. This would require an increase of 1,513 AUMs for elk, which is insignificant when compared to the available forage of the total planning area. Lethal methods would be allowed for animal damage control for both livestock and wildlife protection. This could directly benefit livestock operations by removing animals known to have killed livestock.

Approximately 10,860 AUMs within the JMH CAP planning area (see Table 4-11 at the end of Chapter 4) would be necessary to support the WGFD herd unit population objectives for elk (1,200), mule deer (4,000), antelope (6,000), and wild horses (415–600). Estimates of AUMs were based on AUEs specified in the Draft Environmental Impact Statement for the Proposed Grazing Management Program for the Salt Wells-Pilot Butte Area, 1983. This use, combined with the anticipated use of 11,569 AUMs for livestock, could degrade forage resources on some allotments and thus jeopardize compliance with the Wyoming Standards for Healthy Rangelands. This could result in the need to make grazing adjustments and implement appropriate actions to comply with the standards.

Recreation management actions under this alternative would affect livestock grazing in ways similar to those under Alternative 2. Camping would be allowed only in designated areas, and parties of 10 or more would require a group camping permit. This would help in monitoring concentration of use, limit camping along streams, and reduce compaction of vegetation and soils. Closing some areas OHV use or restricting OHV use to designated areas would reduce the potential for damage to forage resources. The planning area would be withdrawn from recreational mining use except for a 5-acre site that would be designated and managed for recreational mining; thus, surface disturbance or loss of forage from this type of activity would be negligible.

Impacts from mineral exploration and development, and from other surface disturbances in support of these activities (e.g., ROWs), would be similar to those discussed under the No Action Alternative. The amount of surface disturbance associated with mineral development under this alternative would be approximately 190 acres in the most active year and approximately 1,600 acres over the planning period (Appendix 13, Table A13-7), which would represent an insignificant impact on livestock grazing when compared to the size of the planning area. Standards for reclamation of linear surface disturbances would help mitigate impacts on livestock grazing related to vegetation removal. Effects from most mineral development would be temporary because the vegetation conditions on most sites would ultimately be reclaimed. Effects on grazing could result if development outpaced reclamation and replacement of forage.

Effects related to management actions associated with special management areas would be similar to those under Alternative 2 but not as extensive. Management actions associated with fewer expansions and designations of special management areas under this alternative would result in fewer actions limiting and restricting surface disturbing activities.

4.4.4.6 Proposed JMH CAP

Both wildland and prescribed fires would have short-term impacts on livestock grazing due to a loss of forage resources. However, over the long term, fire has the potential to improve forage production capacity and to convert shrub habitat to grasslands. This would benefit livestock by providing increased levels of preferred forage. The requirement to rest a burn area to allow new vegetation to establish could

have a short-term impact on livestock grazing because the amount of available forage would be reduced for the localized area of the burn. The level of significance of this effect would depend on the extent of the burn area and the season of use. Full fire suppression for basin big sagebrush/lemon scurfpea vegetation associations could also result in short-term impacts on livestock grazing through vegetation removal and loss of plant diversity. This vegetation association stabilizes the sandy soils in which it grows and provides habitat and forage primarily for wildlife. Because of the relatively limited extent of these vegetation associations, impacts on livestock grazing would not be significant.

Watershed management would enhance vegetation resources by reducing erosion and improving water quality. Requiring PFC as the minimum acceptable level of ecological condition for riparian areas would maintain and improve the health of riparian vegetation, which would have the indirect effect of increasing forage levels for livestock. Surface disturbance would be limited within 500 feet of riparian areas and other water resources, thereby conserving forage resources within these areas. However, this could also preclude the construction of water developments and range improvements in these areas unless any impacts on water quality could be mitigated. Riparian exclosures could also adversely affect grazing activities by reducing the amount of available forage for livestock because the exclosures would be closed to grazing. However, the provision under this alternative that allows exclosures to be removed could partially offset these effects. The extent of this effect on livestock operators would depend on the number, location, and size of exclosures at any given time during the planning period.

Wild horse management activities could result in effects on livestock grazing because of competition for forage resources. However, maintaining the AML for horses, implementing monitoring and gathering plans, and allowing water developments would all serve to effectively distribute and limit the growth of wild horse herds, consequently minimizing effects on livestock grazing.

Implementation of livestock grazing management actions could have both beneficial and adverse impacts on livestock operators. Although livestock operators could increase AUM use to the fully permitted amount, anticipated use of AUMs would be similar to historic levels and would not result in any additional grazing pressure on available forage. Most impacts would occur from adjustments for the purposes of complying with the Wyoming Standards for Healthy Rangelands. Such adjustments could include modified turnout dates, shorter grazing periods, growing season rest, riparian exclosures, forage utilization levels, and livestock conversions. Although these adjustments would benefit long-term forage production and consequently livestock growth rates, adverse impacts on livestock operators could occur in the short term. The extent of any impact on livestock grazing operations would depend on the flexibility of the individual operator to implement and respond to these adjustments.

Livestock water developments would provide additional watering sites, thereby improving livestock distribution and reducing competition with other grazers. Requiring that livestock range improvements and water developments improve resource conditions and/or enhance livestock distribution could necessitate additional planning in constructing such developments but would improve long-term forage production and prevent overuse of vegetation resources. Within sensitive wildlife habitat, livestock water developments would be allowed only if resource conditions were improved. This could further improve construction planning of such developments. Salt and mineral placement restrictions (placement prohibited within 500 feet of riparian habitat, historic trails, and special status species habitat) could require additional planning and effort but would help distribute forage use and reduce adverse impacts on rangeland resources. Greater distribution of livestock and improvement of vegetation would directly benefit livestock operators by facilitating compliance with the Wyoming Standards for Healthy Rangelands.

Vegetation management activities would most likely have beneficial effects on livestock grazing management. Any actions designed to enhance vegetative conditions would indirectly benefit livestock

by enhancing and increasing forage production. Vegetation treatments and manipulation could have short-term effects on livestock grazing through vegetation removal, but long-term benefits would be realized through enhanced forage production. Preventing and controlling the spread of invasive plant species would also benefit livestock by reducing competition with native plants, and consequently maintaining or improving forage production.

Activities associated with wildlife habitat management would generally benefit livestock grazing operations through habitat enhancement measures that consequently improve forage production. However, adverse effects could also result because of the inherent competition between big game species and livestock for forage resources. This competition is more pronounced with elk than with antelope or mule deer because of dietary preference. Similar to livestock, elk are considered grazers that prefer grasses, while the preference for mule deer and antelope is to browse shrub species. Large concentrations of these big game animals can occur within portions of the planning area (Map 51), which could require some livestock operators to alter grazing management practices to comply with the Wyoming Standards for Healthy Rangelands. Uneven distribution of big game causes some grazing allotments to receive a disproportionate amount of the total wildlife grazing within the planning area, thereby putting additional strain on the forage resources within those allotments. This is especially true for allotments located either entirely or partially within the south-central portion of the planning area, including the core area, which is birthing and wintering habitat to a majority of the big game populations that inhabit the planning area. Although the population objective for elk would vary between the No Action Alternative (500) and the action alternatives (1,200), impacts on allotments located within the south-central portion of the planning area would remain approximately the same among the alternatives because of the expectation that the elk population in this area would not change considerably. Achieving wildlife population objectives (Section 4.4.6) and implementing the various management options available to livestock operators would help minimize effects. Further effects could occur if management actions resulted in increased wildlife populations, which could reduce available forage for livestock. It is unlikely that this would occur, because of WGFD efforts to maintain objectives. Overall adverse impacts could be slightly greater under this alternative than under the No Action Alternative because the elk population objective would be increased to 1,200. This would require an increase of 1,513 AUMs for elk, which is insignificant when compared to the available forage of the total planning area. Beneficial impacts would also likely be greater than under the No Action Alternative because of expanded protection measures for greater sage-grouse. Placing a controlled surface use stipulation on sage-grouse nesting habitat and increasing the amount of sage-grouse winter habitat subject to seasonal limitations would reduce the level of surface disturbing activities occurring in these areas, thereby reducing related forage removal and degradation. Animal damage control for livestock protection would emphasize nonlethal methods; control techniques and methods would be discussed at an annual meeting. The effects on livestock operations would depend on control techniques and methods. Impacts would be less than under Alternatives 2 and 3, and slightly greater than under the No Action Alternative and Alternative 1.

Approximately 10,860 AUMs within the JMH CAP planning area (see Table 4-11 at the end of this chapter) would be necessary to support the WGFD herd unit population objectives for elk (1,200), mule deer (4,000), antelope (6,000), and wild horses (415–600). Estimates of AUMs were based on AUEs specified in the Draft Environmental Impact Statement for the Proposed Grazing Management Program for the Salt Wells-Pilot Butte Area, 1983. This use, combined with the anticipated use of 11,569 AUMs for livestock, could degrade forage resources on some allotments and thus jeopardize compliance with the "Wyoming Standards for Healthy Rangelands." This could result in the need to make grazing adjustments and to implement appropriate actions to comply with the standards.

Management of heritage sites would generally be limited to relatively small areas. Even under the most intense management (i.e., excavation), the amount of acreage disturbed would be very small. These activities are not anticipated to have measurable impacts on livestock forage resources. Impacts could

occur if heritage sites were fenced from livestock use, causing a loss of available forage. However, given the size of most heritage sites, this impact would be minimal. Other impacts could occur because of restrictions on surface disturbing activities near heritage sites, which might preclude the construction of range improvements designed to facilitate livestock grazing. In contrast, such restrictions would provide protection to vegetation resources, which in turn could maintain or enhance forage conditions. Effects on vegetation resources near the paleosol deposition area would most likely be less extensive than under the No Action Alternative because of management of this area as an archeological district. Management actions would increase protections from surface disturbing activities, thereby reducing adverse impacts on forage resources.

Recreational activities would likely not impact livestock grazing activities except by limited human disturbance. Some impacts might result from the temporary removal of vegetation by campers in concentrated areas, but any impact would be negligible. The use of OHVs would not impact livestock if this recreational activity stayed within authorized areas. However, unauthorized OHV activity could affect livestock grazing by damaging vegetation resources and consequently reducing available forage.

Surface disturbing activities associated with the construction of linear ROWs for pipelines, transmission lines, communication lines, and roads, and oil and gas development, including construction of well pads, mud pits, and roads, could impact livestock grazing. Land clearing and grading activities necessary for construction remove vegetation and reduce the forage base. Impacts stemming from mineral development would be similar to those under Alternative 3, with development of 205 wells and anticipated surface disturbance of approximately 1,600 acres over the planning period (Appendix 13, Table A13-7). However, the strategy for implementing fluid mineral leasing decisions under this alternative (Appendix 17) could affect the degree of impact in certain areas. There would be no new oil and gas leasing in the majority of Area 3 (Figure A17-1), which could reduce impacts in this area over the long term. However, in the short term, this could result in more rapid exploration and development of existing leases in Area 3 because there would not be any opportunity to renew leases upon expiration. Moreover, given that much of this area is within the high development potential area (Map 69), successful well completion rates are expected to be high. These factors could result in the removal of a substantial amount of forage over a relatively short period of time, potentially increasing short-term impacts on livestock grazing compared with Alternative 3. Standards for reclamation of linear surface disturbances would help mitigate potential adverse impacts on livestock grazing due to short-term vegetation removal. Effects from most mineral development would be short term because the vegetation conditions on most sites are ultimately reclaimed. Salable mineral activity is not expected to have any effect on livestock grazing management because of the limited activity and the limited area of vegetation removal. Any mineral withdrawals would prevent vegetation removal and the potential subsequent decrease in the forage base.

The protections afforded to special management areas and other management areas would generally benefit livestock grazing. Management actions aimed at conserving sensitive vegetation communities and limiting surface disturbing activities in these areas would benefit livestock grazing by enhancing overall vegetation conditions and consequently increasing forage production. These effects would most likely be greater than under the No Action Alternative because of the implementation of management actions associated with the expansion of Steamboat Mountain ACEC and management of the West Sand Dunes Archaeological District and the Steamboat Mountain Management Area.

4.4.5 Potential Impacts on Vegetation

Vegetation management includes all plants, the habitats they create, and watershed stability. Resources include species that are protected under the Endangered Species Act (ESA), identified as Wyoming BLM sensitive species, state species of concern, rare plant communities and associations, and noxious weeds. Impacts on resources and resource users resulting from implementation of vegetation management actions

are discussed in those particular resource sections. This section describes potential impact on vegetation resources resulting from the implementation of management actions for other resource management categories.

Effects on vegetation would be considered significant if the viability of protected plant species were jeopardized, with little likelihood of reestablishment after disturbance, or if actions would result in the need to list a species under the ESA. A lesser effect would result if the disturbed population could be reestablished to its original state and condition or if the population were sufficiently large or resilient to respond to disturbance without a measurable change. An impact would also be significant if there is a loss of habitat function or habitat value in BLM sensitive species habitats. An impact would be significant if reclaimed areas did not attain adequate vegetation ground cover and species composition to stabilize the site within 5 years of disturbance or if there were invasion and establishment of noxious weeds that contributed to unsuccessful revegetation. The significance of an impact would also depend on the importance of the resource and the proportion of the resource that would be affected relative to its occurrence in the vicinity. An increase in population numbers in response to an enhanced habitat or the increased viability of a species would be viewed as a beneficial impact.

For analysis purposes, it is assumed that adequate vegetative ground cover and species composition for site stabilization would occur in 3 to 5 years and that brush reestablishment in disturbed areas would not create a vegetative landscape similar to adjacent lands for more than 20 years. Adequate forage is assumed to be available for current wildlife objective numbers, and it is assumed that all management actions associated with the protection of wildlife habitat and cultural resources directly benefit vegetation management. All surface disturbing activities would require reclamation according to the Rock Springs District Reclamation Monitoring Plan, and new oil and gas leases would have stipulations for protection of threatened, endangered, and Wyoming BLM sensitive species.

4.4.5.1 Common to All Alternatives

Implementation of the Wyoming Standards for Healthy Rangelands as the minimum acceptable conditions for public rangelands would increase the health and diversity of vegetation communities. By ensuring that all activities conducted on public lands within the planning area are designed to maintain and enhance native vegetation and promote healthy watersheds, negative impacts on plants and their habitat would be minimized to an acceptable level. Monitoring and evaluation of rangeland uses and effects would occur. Results of these evaluations would determine whether the objectives of this plan are being met, and if not, management actions would be undertaken to improve the conditions of native vegetation.

The potential for additional strain on vegetation resources exists within portions of the planning area (south-central) from potential concentrations of grazing animals. Heavy concentrations of grazing animals could result in overutilization of vegetation. However, monitoring and evaluating habitats for compliance with the Wyoming Standards for Healthy Rangelands would provide information on vegetation resources before impacts became significant.

Wildfires usually have more adverse impacts than do prescribed burns because wildfires generally cover larger areas and remove more vegetation and, if burning outside established prescription, often burn with enough heat to adversely affect soil organisms as well as kill the root system of some plants and the existing seed bank. This could result in long-term adverse impacts by compromising future plant recruitment and growth rates. Prescribed fire burning within prescription areas would generally have a long-term beneficial effect on vegetation by increasing age and species diversity of plant communities, increasing plant vigor, and enhancing nutrient cycling.

Watershed management would provide benefits to native vegetation by maintaining or restoring healthy and diverse plant communities through the establishment of DPC objectives, placement of buffer zones around riparian areas, and restrictions on surface disturbance within riparian areas and floodplains. Actions that would maintain or improve watershed conditions would generally benefit vegetation communities.

Valid existing mineral rights (existing fluid mineral leases and mining claims) cover more than half of the planning area, which could have adverse impacts on vegetation because of a lack of requirements for mitigation that would protect vegetation resources. Adverse effects could be reduced by Conditions of Approval (COA) on Applications for Permit to Drill (APD) within these areas, which would be based on site-specific analysis and would establish specific, necessary mitigation measures not covered by lease stipulations for resource and environmental protection. The severity of effects would depend on the amount of activity and the success of reclamation efforts for disturbed areas.

Reclamation after surface disturbing activities would be conducted in accordance with the Wyoming Policy on Reclamation (IM No. WY-90-231) and the Rock Springs District Reclamation Program. Achievement of the revegetation objectives under reclamation would restore native plant communities in the long term, providing healthy habitat for colonization and expansion of native plant species. Monitoring of disturbed sites would enhance reclamation success. Containerized shrub seedlings used in reclamation practices would help reestablish shrubs in sensitive areas, decreasing adverse impacts in the short term. Significant impacts could occur if adequate revegetation measures were not implemented and monitored to ensure successful revegetation.

The management actions established for special management areas would generally benefit vegetation resources. Protections aimed at conserving sensitive vegetation communities, and limitations on mineral development and other surface disturbing activities, would benefit vegetation by enhancing overall conditions.

4.4.5.2 No Action Alternative

Both wildland and prescribed fires could have short-term localized impacts on vegetation; however, the long-term effect of fire would be the conversion of shrubs to grasslands. Prescribed burning, the preferred method of vegetation treatment, would cause a long-term decrease in sagebrush species, a short-term increase in annual weeds, and a long-term increase in grass species. Vegetative cover would be reduced during the first two growing seasons but would likely improve in the third year following a prescribed burn, resulting in beneficial effects. Approximately 5,000 acres within the planning area are proposed for prescribed burns during the planning period.

Wildfires cause a short-term loss of vegetation. They usually occur in the high-density sagebrush, juniper, conifer, and aspen communities, which leads to grasses' and forbs' replacing shrubs. The surface disturbance associated with fire line construction, the use of heavy equipment, and other fire suppression activity often damages or destroys vegetation and accelerates natural soil erosion. Fire suppression activities within special status plant species habitat would be limited to existing roads and trails to prevent any further impact on these species from crushing or removal.

The effect of fire within the basin big sagebrush/lemon scurfpea community would be adverse because of the unlikelihood of reestablishing of this association within a few years after a fire. Additional prescriptions for managing fire would include full suppression in the basin big sagebrush/lemon scurfpea plant community, providing protection for this unique vegetation association, which stabilizes the sandy soils in this part of the planning area and provides habitat and forage for wildlife.

Watershed management would provide benefits to native vegetation by maintaining or restoring healthy and diverse plant communities through the establishment of DPC objectives, placement of buffer zones around riparian areas, and restrictions on surface disturbance within riparian areas and floodplains. Actions that would maintain or improve watershed conditions would generally benefit vegetation communities.

The vegetation communities likely to be affected by livestock grazing would include the saltbush, low-density sagebrush, high-density sagebrush, aspen, riparian, and grassland communities. Livestock AMPs, or other activity plans intended to serve as the functional equivalent of an AMP, would address achievement of DPC objectives, thereby minimizing impacts on uplands and riparian areas.

Although livestock operators could increase AUM use to the fully permitted amount, anticipated use of AUMs would be similar to historic levels; thus, direct impacts on vegetation would likely be comparable to current conditions. Some localized overuse of forage would continue, primarily in riparian zones and around watering holes and dunal ponds. When forage is overused, plants cannot provide for their own growth, maintenance, and reproduction and are eventually replaced by less desirable species that have little or no forage value. Implementation of the Wyoming Standards for Healthy Rangelands and Guidelines for Livestock Grazing would ensure the viability of vegetation resources.

Livestock water developments could adversely affect vegetation. Areas around existing water sources receive more use than the adjacent uplands, increasing soil exposure and erosion and weed invasion. This would continue in the long term as new water developments were created.

Fencing would be used to manage livestock grazing to improve forage and habitat condition on upland and wetland sites. Range condition should improve in localized areas where fences were used to implement grazing management plans or to better distribute livestock. More diverse vegetation would be produced, and soil erosion would be reduced. Herding control would be encouraged as an alternative to fencing, which could also provide benefits to vegetation.

Season-long grazing use of range grasses has significant adverse impacts on their physiological health. Grasses that are grazed too long, too closely, or too frequently at the same stage of growth display marked reductions in vigor and health, becoming more susceptible to drought, injury, and lower production. Decline in soil condition, plant cover, and species composition encourages the invasion and growth of noxious weeds. Early spring grazing would also have adverse impact on range grass and forb species through the trampling of wet soils, uprooting of seedlings, and mechanical injury to both mature plants and new seedlings. This adverse impact would be recognized in AMPs, or other activity plans intended to serve as the functional equivalent of an AMP and would be minimized through implementation of the Wyoming Standards for Healthy Rangelands and Guidelines for Livestock Grazing.

The management of heritage sites would indirectly benefit vegetation through preservation of rare and sensitive plant communities as well as general vegetation characteristics. Disturbance and removal of vegetation could occur through activities related to management of heritage resources; however, any impact would generally be minor and limited to relatively small areas. Even under the most intense management (i.e., excavation), the amount of vegetation disturbed would be very small.

Recreational management actions could have localized impacts on vegetation, primarily from unauthorized OHV use. The greatest loss of vegetation associated with OHV use would result from unauthorized use of previously undisturbed areas. All vegetation classifications could be damaged by unauthorized OHV use, but such damage would be most common in badlands, low-density sagebrush, juniper, saltbush, and sand dune vegetation communities. A long-term loss of native vegetation due to

weed invasions would also be expected with OHV use. However, these effects are anticipated to be localized.

Recreational activities, such as camping and recreational mining, could also damage vegetation through concentrated use, trampling, and digging. Camping would be allowed within 200 feet of water sources except in areas where it would be necessary to protect water quality and wildlife and livestock watering areas. If resource damage occurred, those areas would be closed to camping to minimize long-term adverse impacts. Recreation events such as OHV rallies could damage or totally remove vegetation from portions of the event route. Special recreation use permits for such events would require timing and avoidance of key areas and reclamation of the disturbed area to minimize adverse impacts on vegetation resources. Adverse effects of recreational mining would be minimal because of the small amount of area disturbed.

Surface disturbance associated with livestock water developments or mineral activities other than oil and gas would account for approximately 119 acres of disturbance to vegetation (oil and gas surface disturbance is detailed below). This total would include 23 acres (worst case) disturbed during construction of livestock water developments (assuming 1 acre per development), 1 acre for wild horse traps, 55 acres for mineral location (with no more than 5 acres disturbed at one time), 15 acres for solid mineral development, and 25 acres for mineral material sales.

Surface disturbing activities associated with the construction of linear ROWs for pipelines, transmission lines, communication lines, and roads, and oil and gas development, including construction of well pads, mud pits, and roads, could adversely impact vegetation resources. Land clearing and grading activities necessary for construction remove vegetation and compact soils, which contributes to noxious weed invasion. The amount of surface disturbance associated with fluid mineral development would be approximately 200 acres in the most active year and approximately 1,800 acres over the planning period (Appendix 13, Table A13-7), representing an insignificant impact on vegetation when compared to the size of the planning area. However, this impact could be significant if the vegetation lost were of a type that was not abundant within the planning area. Loss of vegetation could be short term or long term depending on the success of reclamation efforts for disturbed areas. However, even if reclamation were successful, some original plant communities, particularly shrub communities and stabilized sand dunes, would not be likely to be reestablished to their predisturbance structure and density for more than 20 years. The basin big sagebrush/lemon scurfpea community would likely take up to 70 years to reach the structure and density of predisturbance conditions. Some of these communities would be provided protection by controlled surface use or by NSO requirements, preserving the character of vegetation communities. Disturbed sites would be monitored for effective reclamation, and linear ROWs would avoid BLM Wyoming sensitive species locations. Effects from most mineral development would be temporary because the vegetation conditions on most sites would ultimately be reclaimed. An adverse impact on vegetation could result if development outpaced reclamation and reestablishment of vegetation.

Constructing wells or access roads in stabilized dunes would cause direct loss of anchoring vegetation, creating active dunes that might not stabilize with natural vegetation within the planning period (20 years). One such stabilized dune community, the basin big sagebrush/lemon scurfpea association, is not known to exist elsewhere in the country to the quantity and extent it does in the planning area. Disturbance of this plant community would likely result in the long-term loss of this unique vegetation type for the life of this plan and would therefore result in a significant impact.

A large portion of the planning area would be withdrawn from locatable mineral exploration and development and mineral material sales. Approximately half of the known unique plant communities of basin big sagebrush/lemon scurfpea and aspen would be protected from locatable mineral activity through the withdrawal of the Greater Sand Dunes ACEC and South Pass Summit. Areas would be closed to

mineral material sales through the closure of the Greater Sand Dunes ACEC, Steamboat Mountain ACEC, and the Sand Dunes Wilderness Study Area (WSA). Some of the rare aspen communities would also be closed to mineral material sales through the closure of South Pass Summit. Subjecting areas to mineral activity could result in direct removal of shrubs and trees, causing adverse long-term effects on these communities through conversion to grassland and nonwoodland-type areas. The majority of basin big sagebrush/lemon scurfpea and other mountain shrub communities would be open to coal exploration and development, which could have adverse long-term effects because of direct removal of these communities and long-term reclamation periods. However, it would be unlikely that any locatable mineral development would take place during the planning period because of projected demand.

Noxious weeds are expected to increase under this alternative as a result of surface disturbing activities. Weeds have direct adverse impacts on native vegetation and, once established, are extremely costly and time consuming to control and even harder to eradicate. Vehicles, horses, wildlife, livestock, campers and hikers, and just about any other mobile conveyance would spread weed seeds from their source into disturbed areas. Most adverse impacts due to noxious weeds and other invasive species are expected to occur adjacent to roads because they convey high levels of traffic to and from the planning area.

Although vegetation would be affected by surface disturbing activities within the planning area, specific mitigation measures would be implemented to protect certain species. The two federally listed plant species potentially occurring within the planning area, Ute ladies'-tresses and blowout penstemon, would not likely be adversely affected. Required surveys for threatened and endangered species before surface disturbance activities and subsequent protection measures developed by BLM in conjunction with the U.S. Fish and Wildlife Service (FWS) would help mitigate potential impacts. Searches for special status species would be required in potential habitats for those species before approval of any project or activity in those areas. Known locations of these communities would be protected and closed to or withdrawn from OHV use, surface disturbance and disruptive activities, locatable mineral development, mineral material sales, and coal and sodium exploration. Wyoming BLM sensitive plant species would also be avoidance areas for ROWs. These requirements would reduce adverse impacts to special status plant species communities; however, existing fluid mineral leases do not contain lease stipulations protecting these species. COAs on APDs within existing lease areas could be applied, which would be based on site-specific analysis and would establish specific, necessary mitigation measures not covered by lease stipulations for resource and environmental protection, reducing potential adverse effects that would occur if habitat were disturbed during development.

4.4.5.3 Alternative 1

Impacts resulting from management of heritage resources, the fire program, and vegetation resources would be similar to those under the No Action Alternative.

The effects of watershed management actions would be similar to those under the No Action Alternative, except that these beneficial impacts would be greatly reduced because there would be fewer restrictions on surface disturbing activities and smaller buffer zones around riparian areas and floodplains.

Livestock grazing management actions under this alternative could have greater adverse impacts on vegetation resources than those under other alternatives. The anticipated use of livestock AUMs would increase over the planning period to the permitted active use amount, which is approximately double the historic use. Together with forage utilization by big game species, this would further increase grazing pressure on vegetation resources, potentially having an adverse impact if the long-term productivity of the range were compromised. This additional impact would be realized only on allotments that are not currently close to using their fully permitted AUMs. Riparian exclosures would be removed and the area made available to livestock grazing. New exclosures would not be considered unless they benefited

commodity uses. This would have the potential to adversely affect vegetation through overuse of particular areas. Less restrictive measures for range improvements, water developments, and salt and mineral placement could limit the protections afforded to vegetation resources. Full implementation of these management actions could present some difficulty for allotments in complying with the Wyoming Standards for Healthy Rangelands.

The effects of OHV use and other recreational activities would be greater and would occur over more of the planning area under this alternative than under the No Action Alternative because of fewer restrictions on use in the planning area and increased development that would allow for increased access. OHV use would be limited to existing roads and trails, rather than limited to designated roads and trails, in more of the planning area (Map 19), and more roads would be developed that would allow for increased OHV use and associated human activity.

The effects of surface disturbing activities on vegetation resources are expected to be similar under this alternative to those under the No Action Alternative, except these adverse impacts would likely be greater because of increased development and decreased restrictions on surface disturbance. More areas would be disturbed. Effects to sensitive plant communities would be reduced only by the designation of the Greater Sand Dunes ACEC as an avoidance area (Map 16).

Surface disturbance associated with livestock water developments or mineral activities other than oil and gas would be the same as those under the No Action Alternative.

The planning area would be open for new mineral development. The amount of surface disturbance associated with fluid mineral development would be approximately 220 acres in the most active year and approximately 2,100 acres over the planning period (Appendix 13, Table A13-7), which would represent an insignificant impact on vegetation when compared to the size of the planning area. However, this impact could be significant if the vegetation lost were of a type that was not abundant within the planning area. The impacts on vegetation would be similar to those under the No Action Alternative. A significant adverse impact on vegetation could result if development outpaced reclamation and reestablishment of vegetation.

A large portion of the planning area would be open to locatable mineral exploration and development (Map 23) and mineral material sales (Map 24). Adverse effects on all vegetation communities would be expected to be greater than under the No Action Alternative because of the increased area available to development. The majority of basin big sagebrush/lemon scurfpea and other mountain shrub communities would be open to coal exploration and development, as under the No Acton Alternative; however, it is unlikely that any development would take place during the planning period because of projected demand.

The potential effects on the two federally listed plant species potentially occurring within the planning area, Ute ladies'-tresses and blowout penstemon, would be the same as those discussed under the No Action Alternative.

In any potential habitats for special status species, searches for the species would be required before approval of any project or activity in those areas, as under the No Action Alternative. Known locations of these communities would be avoidance areas for surface disturbing activities. New leases would contain stipulations that protect these communities, and COAs on APDs within existing lease areas could be applied, which would be based on site-specific analysis and would establish specific, necessary mitigation measures not covered by lease stipulations for resource and environmental protection, reducing potential adverse effects that would occur if habitat were disturbed during development. Overall, adverse effects

on special status plant species could be significant because of the lack of complete protection of these communities from the majority of surface disturbing activities within the planning area.

The beneficial impacts on vegetation resources from management activities related to special management areas could be reduced under this alternative compared with the No Action Alternative by eliminating certain management actions associated with the removal of the ACEC designation from Steamboat Mountain ACEC and the reduction of the viewshed associated with the South Pass Historic Landscape. The vegetation communities in the Steamboat Mountain area would be the most affected. These changes would allow more surface disturbance, potentially reducing overall benefits to vegetation resources.

4.4.5.4 Alternative 2

Impacts resulting from management of heritage resources would be the same as those under the No Action Alternative.

The effects of watershed management actions would be the same as those under the No Action Alternative; however, these beneficial impacts would be greatest under this alternative because of increased restrictions on surface disturbing activities and larger buffer zones around riparian areas and floodplains.

The increased restrictions on livestock grazing activities under this alternative would likely have beneficial impacts on vegetation resources. Although livestock operators could increase AUM use to the fully permitted amount, anticipated use of AUMs would be similar to historic levels. Using modified turnout dates as the primary method for complying with the Wyoming Standards for Healthy Rangelands could have beneficial effects on vegetation resources by reducing grazing pressures. Increasing the buffer area for salt and mineral placement to one-half mile from special status plant species would require more planning and effort on the part of livestock operators and could increase related costs. Whether the one-half-mile distance would provide greater protection to vegetation than would some shorter distance would depend on the topography, drainage patterns, and the amount of vegetative cover at a particular location. Riparian exclosures and water developments would be allowed if they preserved sensitive resources or improved habitat and resource conditions, having a beneficial impact on vegetation resources.

Vegetation treatments would be limited to noxious weed control. The benefits associated with improved forage production capacity and the conversion of shrub habitat to grasslands through prescribed burns or other treatments would not occur under this alternative. Natural succession would be allowed. Limited fire suppression (as opposed to full fire suppression) would be applied for basin big sagebrush/lemon scurfpea vegetation associations, but this could have an adverse effect on vegetation. This vegetation association stabilizes the sandy soils in portions of the planning area, and the reestablishment of the association within a few years after a fire would be unlikely, resulting in a long-term loss of this unique vegetation type and therefore a significant impact.

The adverse effects of OHV use and other recreational activities would be less under this alternative than under the No Action Alternative because of decreased development and increased restrictions on use in the planning area, which would decrease access. More of the planning area would be closed or restricted to OHV use, thus reducing access to a large portion of the planning area (Map 30). Camping in groups of five or more would be monitored and only allowed in designated areas, decreasing adverse effects on rare and sensitive plant communities and riparian areas.

Development of a transportation plan specific to the planning area would further reduce adverse impacts on vegetation from ROWs, roads, OHV use, and general access. This plan would provide for appropriate access routes that would enable maximum protection of rare plant communities and sensitive resources.

Surface disturbance associated with livestock water developments or mineral activities other than oil and gas would account for approximately 64 acres of disturbance to vegetation (oil and gas surface disturbance is detailed below). This total would include 11 acres (worst case) disturbed during construction of livestock water developments (assuming 1 acre per development) and 53 acres for mineral location on existing claims (with no more than 5 acres disturbed at one time).

This alternative provides the least opportunity for mineral exploration and development, which would minimize related losses of vegetation. The effects of surface disturbing activities for mineral development and ROWs are expected to be much less than under the No Action Alternative because of increased restrictions (controlled surface use or NSO requirements) and decreased opportunity for development. The amount of surface disturbance associated with fluid mineral development would be approximately 170 acres in the most active year and approximately 1,300 acres over the planning period (Appendix 13, Table A13-7), which would represent an insignificant impact on vegetation when compared to the size of the planning area, depending on the vegetation type affected. Adverse impacts on sensitive plant communities would be reduced by managing the Greater Sand Dunes ACEC, the connectivity area, and the Steamboat Mountain ACEC as avoidance areas (Map 27). Other areas important to rare and sensitive plant communities would be ROW exclusion areas, which include WSAs and the paleosol deposition area. Effects from most mineral development would be temporary because the vegetation conditions on most sites would ultimately be reclaimed. However, an adverse impact on vegetation could result if development outpaced reclamation and replacement of forage or if the amount of a particular type of vegetation that was disturbed were small in comparison to other vegetation in the planning area.

There would be no effects on vegetation from new locatable mineral development, mineral material sales, coal leasing, or coal and sodium exploration because the entire planning area would be withdrawn from or closed to these activities.

Adverse impacts of noxious weed infestations on vegetation resources would be less than under the No Action Alternative because of an anticipated decrease in access and activity that would otherwise introduce or aid in spreading noxious weed or other invasive species in the planning area.

Potential effects on the two federally listed plant species potentially occurring within the planning area, Ute ladies'-tresses and blowout penstemon, would be the same as those discussed under the No Action Alternative.

Searches for special status species would be required in potential habitats for the species before approval of any project or activity in those areas. Known locations of these communities would be designated as an ACEC, with measures providing additional protection. Known locations would also be protected and closed to OHV use, ROWs, surface disturbance, locatable mineral development, mineral material sales, coal and sodium exploration, and geophysical exploration. Effects of existing fluid mineral leases would be the same as those described under the No Action Alternative; however, new leases would contain stipulations that protect these communities. Overall, impacts on special status plant species could occur on existing leases, but effects would be reduced through application of COAs designed to establish specific, necessary mitigation measures not covered by lease stipulations for resource and environmental protection.

Actions related to special management areas could have a greater beneficial impact on vegetation resources under this alternative. Management actions associated with the expansion of the Greater Sand Dunes ACEC and Steamboat Mountain ACEC would benefit rare and sensitive plant communities through further restrictions on activities within these sensitive areas (Map 37). The Greater Sand Dunes ACEC would be expanded to include the paleosol deposition area, and the Steamboat Mountain ACEC would be expanded to include the area of highest concentration and overlap of big game habitat features, natural systems, and cultural values, including a portion of the basin big sagebrush/lemon scurfpea plant community. Management actions associated with designating special status plant species habitat and the cushion plant communities as ACECs, and designation of the Pinnacles Geologic Feature ACEC, would also benefit these communities and protect them from disturbance.

Management actions associated with the designation of the cushion plant community, the flockets area within the WSA portion of the Greater Sand Dunes ACEC, and a portion of the basin big sagebrush/lemon scurfpea association as research natural areas would further benefit these plant communities.

4.4.5.5 Alternative 3

Impacts associated with noxious weed and other invasive species infestations resulting from surface disturbing activities and impacts from management of heritage resources would be similar to those under the No Action Alternative.

Areas impacted by prescribed burns or wildland fires would be rested for 24 months after treatment to allow the vegetation to adequately reestablish before it was grazed. Full fire suppression in the basin big sagebrush/lemon scurfpea plant community would be applied to provide protection for this unique vegetation association. This vegetation association stabilizes the sandy soils in portions of the planning area. Reestablishment of this association in these soil conditions within a few years after a fire would be unlikely.

The effects of watershed management actions would be the same as those under the No Action Alternative, except that these beneficial impacts could be greater because of increased restrictions on surface disturbing activities and larger buffer zones around riparian areas and floodplains.

Livestock grazing management actions under this alternative would have impacts on vegetation similar to those under the No Action Alternative. Although livestock operators could increase AUM use to the fully permitted amount, anticipated use of AUMs would be similar to historic levels and would not result in any additional grazing pressure on available forage. Construction and maintenance of livestock range improvements and water developments would be designed to improve resource conditions and/or enhance livestock distribution. This would maintain healthy forage conditions and prevent overuse of vegetation resources. Prohibiting salt and mineral supplements within one-quarter mile of special status plant species would ensure that these species would not be adversely impacted.

Development of a transportation plan specific to the planning area would further reduce adverse impacts on vegetation from ROWs, roads, OHV use, and general access. This plan would provide for appropriate access routes that enabled maximum protection of rare plant communities and sensitive resources.

Any adverse effects of OHV use and other recreational activities would be slightly less under this alternative than under the No Action Alternative because of restrictions associated with management of additional ACECs. OHV use would be limited to designated roads and trails in more areas, further reducing access to portions of the planning area (Map 41). Camping would be allowed only in designated areas, decreasing adverse effects on rare and sensitive plant communities and riparian areas. Recreational

mining would be limited to a 5-acre site, and a recreation site plan would be prepared and implemented to manage the site for recreational purposes.

The adverse impacts related to surface disturbing activities are expected to be slightly less than those described under the No Action Alternative because of additional controlled surface use requirements (Map 39) and management actions associated with ACECs. Adverse impacts to sensitive plant communities would be reduced by the designation of the WSAs and the southern portion of Steamboat Mountain as exclusion areas.

The entire planning area would be open for consideration for fluid mineral leases. Impacts on vegetation from mineral exploration and development and other surface disturbances in support of these activities (i.e., ROWs) would be similar to those under the No Action Alternative; however, an adaptive management strategy would be implemented under this alternative, which would establish indicators to inform BLM of adverse effects of actions within the planning area and prevent them from becoming significant through BLM's ability to control timing of development activities.

Surface disturbance associated with livestock water developments or mineral activities other than oil and gas would be the same as that under the No Action Alternative.

The extent of surface disturbance associated with fluid mineral development would be approximately 190 acres in the most active year and approximately 1,600 acres over the planning period (Appendix 13, Table A13-7), which would represent an insignificant impact on vegetation when compared to the size of the planning area. The level of impact on vegetation types would depend on the location of the development and the vegetation type affected. Standards for reclamation of linear surface disturbances would mitigate any potential impact on vegetation removal. Effects from most mineral development would be temporary because the vegetation conditions on most sites would ultimately be reclaimed. An adverse impact on vegetation could result if development outpaced reclamation and replacement of forage.

A large portion of the planning area would be open to locatable mineral activity (Map 45); however, adverse effects on all vegetation communities would be less than those under the No Action Alternative because additional areas (such as greater sage-grouse leks) would be withdrawn from all mineral location.

A portion of the rare plant community of basin big sagebrush/lemon scurfpea would be closed to mineral material sales through the closure of the Greater Sand Dunes ACEC and the Sand Dunes WSA (Map 46); however, adverse effects would occur on the remainder of the community. Some of the rare aspen communities would also be closed to mineral material sales through the closure of South Pass Summit. Any impact on these communities would likely be significant because of the species' limited ability to reestablish after disturbance.

The unique cushion plant community would be closed to coal and sodium exploration (Map 43), but the majority of basin big sagebrush/lemon scurfpea and other mountain shrub communities would be open. Although any development could have adverse impacts on these vegetative communities, the impact would not likely be significant because the demand for this resource in this particular area is negligible.

Potential effects on the two federally listed plant species potentially occurring within the planning area, Ute ladies'-tresses and blowout penstemon, would be the same as those discussed under the No Action Alternative.

Searches for special status species would be required in any potential habitats for such species before approval of any project or activity in those areas. Known locations would be protected and closed or withdrawn from OHV use, ROWs, surface disturbance, locatable mineral development, mineral material

sales, coal and sodium exploration, and geophysical exploration. Effects of existing fluid mineral leases would be the same as those described under the No Action Alternative; however, new leases would contain stipulations that protect special status species communities.

Management actions associated with the expansion of the Greater Sand Dunes and Steamboat Mountain ACECs would benefit rare and sensitive plant communities through further restrictions on activities within these sensitive areas (Map 48). The Greater Sand Dunes ACEC would be expanded to include the paleosol deposition area, and the Steamboat Mountain ACEC would be expanded to include Indian Gap and the face of Steamboat Mountain. Management actions associated with designating special status plant species habitat and the cushion plant communities as ACECs would also benefit and protect these communities.

4.4.5.6 Proposed JMH CAP

Implementation of the Wyoming Standards for Healthy Rangelands as the minimum acceptable conditions for public rangelands would increase the health and diversity of planning area vegetation communities. By ensuring that all activities conducted on public lands within the planning area were designed to maintain and enhance native vegetation and promote healthy watersheds, negative impacts on plants and their habitat would be minimized to an acceptable level. Monitoring and evaluation of rangeland uses and effects would occur. Results of these evaluations would determine whether the objectives of this plan were being met; if not, management actions would be undertaken to improve the conditions of native vegetation.

The potential for additional strain on vegetation resources exists within portions of the planning area (south-central) from potential concentrations of grazing animals. Heavy concentrations of grazing animals could result in overutilization of vegetation. However, monitoring and evaluation of habitats to comply with the Wyoming Standards for Healthy Rangelands would provide information on vegetation resources before impacts became significant.

Both wildland and prescribed fires could have short-term localized impacts on vegetation; however, the long-term effect of fire would be the conversion of shrub habitat to grasslands. Prescribed burning, the preferred method of vegetation treatment, would cause a long-term decrease in sagebrush species, a short-term increase in annual weeds, and a long-term increase in grass species. Vegetative cover would be reduced during the first two growing seasons but would likely improve in the third year following a prescribed burn, resulting in beneficial effects. Approximately 5,000 acres within the planning area are proposed for prescribed burns during the planning period.

Wildfires cause a short-term loss of vegetation. Wildfires usually occur in the high-density sagebrush, juniper, conifer, and aspen communities, which leads to grasses' and forbs' replacing shrubs. The surface disturbance associated with fire line construction, the use of heavy equipment, and other fire suppression activity often damage or destroy vegetation and accelerate natural soil erosion. Fire suppression activities within special status plant species habitat would be limited to existing roads and trails to prevent any further impact on these species from crushing or removal.

Wildfires usually have more adverse impacts than do prescribed burns because wildfires generally cover larger areas and remove more vegetation and, if burning outside established prescription, often burn with enough heat to adversely affect soil organisms and kill the root system of some plants and the existing seed bank. This could result in long-term adverse impacts by compromising future plant recruitment and growth rates. Prescribed fire burning within prescription areas would generally have a long-term beneficial effect on vegetation by increasing age and species diversity of plant communities, increasing plant vigor, and enhancing nutrient cycling.

Fire within the basin big sagebrush/lemon scurfpea community would have an adverse effect because of the unlikelihood of reestablishing this association within a few years after a fire. Additional prescriptions for managing fire would include full suppression in the basin big sagebrush/lemon scurfpea plant community, providing protection for this unique vegetation association, which stabilizes sandy soils in portions of the planning area and provides habitat and forage, primarily for wildlife.

Watershed management would provide benefits to native vegetation by maintaining or restoring healthy and diverse plant communities through the establishment of DPC objectives, placement of buffer zones around riparian areas, and restrictions on surface disturbance within riparian areas and floodplains. Actions that would maintain or improve watershed conditions would generally benefit vegetation communities.

The vegetation communities that would likely be affected by livestock grazing would include saltbush, low-density sagebrush, high-density sagebrush, aspen, riparian, and grassland communities. Livestock AMPs, or other activity plans intended to serve as the functional equivalent of an AMP, would address achieving DPC objectives, thereby minimizing impacts on uplands and riparian areas.

Although livestock operators could increase AUM use to the fully permitted amount, anticipated use of AUMs would be similar to historic levels; thus, direct impacts on vegetation would likely be comparable to current conditions. Some localized overuse of forage would continue, primarily in riparian zones, and around watering holes and dunal ponds. When forage is overused, plants cannot provide for their own growth, maintenance, and reproduction and are eventually replaced by less desirable species that have little or no forage value. Implementation of the Wyoming Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management would ensure the viability of vegetation resources.

Livestock water developments could negatively affect vegetation. Areas around existing water sources receive more use than the adjacent uplands, increasing soil exposure and erosion and weed invasion. This would continue in the long term as new water developments were created. However, effects on certain areas of sensitive habitat would be reduced because water developments would be considered only if resource conditions were maintained or improved.

Fencing would be used to manage livestock grazing to improve forage and habitat condition on upland and wetland sites. Range condition should improve in localized areas where fences were used to implement grazing management plans or to better distribute livestock. More diverse vegetation would be produced, and soil erosion would be reduced. Herding control would be considered as an alternative to fencing, which could also provide benefits to vegetation.

Season-long grazing use of range grasses has significant adverse impacts on their physiological health. Grasses that are grazed too long, too closely, or too frequently at the same stage of growth display marked reductions in vigor and health, becoming more susceptible to drought, injury, and lower production. Decline in soil condition, plant cover, and species composition encourages the invasion and growth of noxious weeds and other invasive species. Early spring grazing would also have adverse impacts on range grass and forb species through trampling of wet soils, uprooting seedlings, and mechanical injury to both mature plants and new seedlings. This adverse impact would be recognized in AMPs, or other activity plans intended to serve as the functional equivalent of an AMP, and would be minimized through implementation of the Wyoming Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management.

Reclamation of surface disturbing activities would be conducted in accordance with the Wyoming Policy on Reclamation (IM No. WY-90-231) and the Rock Springs District Reclamation Program. Achievement of the revegetation objectives under reclamation would replace native plant communities in the long term,

providing healthy habitats for colonization and expansion of native plant species. Monitoring of disturbed sites would enhance reclamation success. Containerized shrub seedlings used in reclamation practices would help reestablish shrubs in sensitive areas, decreasing adverse impacts in the short term.

The management of heritage sites would indirectly benefit vegetation through preservation of rare and sensitive plant communities as well as general vegetation characteristics. Disturbance and removal of vegetation could occur through activities related to management of heritage resources; however, any impact would generally be minor and limited to relatively small areas. Even under the most intense management (i.e., excavation), the amount of vegetation disturbed would be very small.

Recreational management actions could have localized impacts on vegetation, primarily from unauthorized OHV use. The greatest loss of vegetation associated with OHV use would result from unauthorized use of previously undisturbed areas. All vegetation classifications could be damaged by unauthorized OHV use, but such damage would be most common in badlands, low-density sagebrush, juniper, saltbush, and sand dune vegetation communities. A long-term loss of native vegetation due to weed invasions would also be expected with OHV use. However, these effects are anticipated to be localized.

Recreational activities, such as camping and recreational mining, could also damage vegetation through concentrated use, trampling, and digging. Camping would be allowed within 200 feet of water sources except in areas where it would be necessary to protect water quality and wildlife. If resource damage occurred, these areas would be closed to camping throughout the planning area to minimize long-term adverse impacts. Adverse effects of recreational mining would be minimal because of the small area disturbed.

Recreation events such as OHV rallies could damage or totally remove vegetation from portions of the event route. Special recreation use permits for such events would require timing and avoidance of key areas, and reclamation of the disturbed area, to minimize adverse impacts on vegetation resources.

Surface disturbance associated with livestock water developments or mineral activities other than oil and gas would be the same as that under the No Action Alternative.

Surface disturbing activities associated with the construction of linear ROWs for pipelines, transmission lines, communication lines, and roads, and oil and gas development, including construction of well pads, mud pits, and roads, could adversely affect vegetation resources. Land clearing and grading activities necessary for construction remove vegetation and compact soils, which contributes to noxious weeds and other invasive species. Loss of vegetation could be short-term or long-term, depending on the success of reclamation efforts for disturbed areas. However, even with successful reclamation, some original plant communities, particularly shrub communities and stabilized sand dunes, would not likely be reestablished to their predisturbance structure and density for more than 20 years. The basin big sagebrush/lemon scurfpea community likely would take up to 70 years to reach the structure and density of predisturbance conditions. Some of these communities would be provided protection by controlled surface use or NSO requirements, thereby preserving the character of vegetation communities.

The extent of surface disturbance associated with fluid mineral development would be approximately 190 acres in the most active year and approximately 1,600 acres over the planning period (Appendix 13, Table A13-7), which would represent a minimal impact on vegetation overall when compared to the size of the planning area, particularly given the reclamation activities associated with each drilled well. The majority of special status plant species and unique plant communities (i.e., cushion plants) are located within Area 3 of the JMH CAP fluid mineral leasing implementation strategy (Appendix 17). Area 3 would retain a “no lease” management prescription or be subject to leasing with an NSO stipulation that would ensure

protection of special status plant species and unique plant communities in these areas, resulting in less impacts on these resources than under the No Action Alternative. A large portion of special status plant species and unique plant communities within Area 3, however, are in areas that have already been leased. These existing leases have a variety of stipulations for resource protection, some of which might not offer any protection to sensitive vegetative resources, possibly allowing significant impacts on these resources. In these cases, COAs for APDs could be applied. These would be based on site-specific analysis and would establish specific, necessary mitigation measures not covered by stipulations for resource and environmental protection. BLM specialists would review sensitive resources with lease operators to develop and implement protective measures to allow effective development operations where impacts could be avoided or mitigated. As part of the "no lease" prescription in Area 3, existing leases that expired before they were developed or were held by production would not be reoffered for lease, further protecting vegetative resources.

Management prescriptions for special status plant species and unique plant communities and possible use of COAs on leases without protection for these species would reduce adverse impacts; however, overall significant adverse effects could occur if development without protective COAs (due to economic effects on developers) could continue in these areas.

Construction of wells or access roads in stabilized dunes would cause direct loss of anchoring vegetation, creating active dunes that might not stabilize with natural vegetation within the planning period (20 years). One such stabilized dune community, the basin big sagebrush/lemon scurfpea association, is not known to exist elsewhere in the country to the quantity and extent that it does in the planning area. Any disturbance of this plant community would likely result in the long-term loss of this unique vegetation type for the life of this plan and would therefore produce a significant impact.

A portion of the planning area would be withdrawn from locatable mineral exploration and development (Map 53), and mineral material sales (Map 58). Approximately half of the known unique plant communities of basin big sagebrush/lemon scurfpea would be protected from locatable mineral activity through the withdrawal of the western portion of the Greater Sand Dunes ACEC. The larger aspen communities would also be protected by the withdrawal of South Pass Summit and the northern elk birthing areas. The basin big sagebrush/lemon scurfpea community would also be closed to mineral material sales through the closure of the Greater Sand Dunes ACEC, the Steamboat Mountain ACEC, and the Sand Dunes WSA. Parts of the aspen communities would also be closed to mineral material sales through the closure of South Pass Summit. Special status plant species would be withdrawn from mineral location and closed to mineral material sales. Subjecting areas to mineral activity could result in direct removal of shrubs and trees, causing adverse long-term effects on these communities through conversion to grassland and nonwoodland-type areas.

The majority of the basin big sagebrush/lemon scurfpea and other mountain shrub communities would be open to coal exploration and development, which could cause adverse long-term effects because of direct removal of these communities and lengthy reclamation periods. However, it would be unlikely that any development would take place during the planning period because of projected demand.

Noxious weeds and other invasive species are expected to increase under this alternative as a result of surface disturbing activities. Weeds have direct adverse impacts on native vegetation and, once established, are extremely costly and time consuming to control, and even harder to eradicate. Vehicles, horses, wildlife, livestock, campers and hikers, and just about any other mobile conveyance would spread weed seeds from their source into disturbed areas. Most adverse impacts due to noxious weeds are expected to occur adjacent to roads because they convey high levels of traffic to and from the planning area.

Although vegetation would be affected by surface disturbing activities within the planning area, specific mitigation measures would be implemented to protect certain species. The two federally listed plant species potentially occurring within the planning area, Ute ladies'-tresses and blowout penstemon, would not likely be adversely affected. Required surveys for threatened and endangered species before surface disturbing activities and subsequent protective measures developed by BLM in conjunction with USFWS would help mitigate potential impacts. Searches for special status species would be required in potential habitats for those species before approval of any project or activity in those areas. Known locations of these communities would be protected and closed to or withdrawn from OHV use, locatable mineral development, mineral material sales, and coal and sodium exploration. BLM Wyoming sensitive plant species would also be avoidance areas for ROWs. A portion of the habitat would be closed to surface disturbance and disruptive activities through either a closed-to-leasing or an NSO designation.

The management actions established for special management areas would generally benefit vegetation resources. The expansion of Steamboat Mountain ACEC to include a portion of the basin big sagebrush/lemon scurfpea plant community would provide protection of this unique community through limitations on mineral development and other surface disturbing activities. The addition of the West Sand Dunes Archaeological District would also likely reduce adverse effects on vegetation through management prescriptions limiting surface disturbing and disruptive activities within special management areas.

4.4.6 Potential Impacts on Wildlife

Wildlife includes all terrestrial, avian, and aquatic animals and their habitats. Resources include species that are protected under the ESA, identified as Wyoming BLM sensitive species, and state species of concern. Impacts on resources and resource users resulting from implementation of the wildlife management actions are discussed in those particular resource sections. This section describes potential impacts on wildlife resulting from the implementation of management actions for other resource management categories.

Impacts on wildlife would be considered significant if the viability of a federally protected species were jeopardized or if actions would result in the need to list a species under the ESA. A lesser impact would result if the disturbed population could be reestablished to its original state and condition or if the population were sufficiently large or resilient to respond to disturbance without a measurable change. The significance of an impact also would depend on the importance of the resource and the proportion of the resource that would be affected relative to its occurrence in the vicinity. An increase in population numbers in response to an enhanced habitat or the increased viability of a species would be viewed as beneficial impacts. Impacts on wildlife would also be considered significant if BLM sensitive species or native wildlife species considered as vital, high, or moderate by the WGFD Mitigation Policy showed increased mortality or decreased survival rates. The WGFD Mitigation Policy also classifies habitats as vital or high. Any loss of habitat function or habitat value in these vital, high, or BLM sensitive species habitats would also indicate significant impacts on wildlife. Long-term displacement of elk, mule deer, or pronghorn antelope from crucial habitat or parturition areas within the planning area would be considered significant.

For analysis purposes, it is assumed that the WGFD herd management objective for the Steamboat elk herd unit would remain at 500 under the No Action Alternative and would increase to the current objective of 1,200 under Alternatives 1, 2, 3, and the Proposed JMH CAP. It is also assumed that sufficient habitat exists to maintain WGFD big game objectives.

It is assumed that a portion of key habitats within the planning area would have year-round activity and that the level of activity within the planning area would increase and additional activity would occur

within portions of these key habitats. Some wildlife adaptation to activities would occur within the planning area; however, this would not outweigh the effects of disturbance due to the lack of topographic escape and cover for elk and mule deer. It is also assumed that as development and recreational activities increased throughout the planning area, increased fragmentation of habitats would occur. Disruptive activities in key habitats are assumed to cause displacement of wildlife.

It is assumed that elk and mule deer compete for parturition and crucial winter range habitat use.

It is assumed that greater sage-grouse populations would continue to decline in the planning area under the No Action Alternative and Alternatives 1 and 3 and that greater sage-grouse population declines in the planning area would slow under Alternative 2 and the Proposed JMH CAP because of maintenance and/or improvement of habitat. It is also assumed that only 50 percent of the greater sage-grouse nesting habitat identified is expected to be suitable for nesting and that only sagebrush vegetation within the greater-sage grouse winter range is expected to be suitable for winter habitat.

Actions implemented to improve watershed quality are assumed to directly improve wildlife habitat in riparian areas. It is assumed that any actions resulting in substantial disturbances to the soils or changes in vegetative cover would have an adverse effect on watershed health and water quality and would therefore have an adverse effect on associated fisheries.

It is also assumed that the majority of oil and gas leases contain stipulations for a minimum of seasonal protection in sensitive wildlife habitats and that new oil and gas leases would have stipulations for protection of threatened and endangered and Wyoming BLM sensitive species.

It is assumed that each water development within the Colorado or the Platte River Basin in the planning area causes a depletion to the respective systems because all water used for livestock pits, ponds, and water wells and/or water used for drilling and completion of wells within the Green River and the Sweetwater River Basins contributes to the surface flows of the Colorado River or Platte River or their tributaries. Livestock water development depletion calculations under each alternative are based on the following assumptions: (1) all developments are installed in year one of the 20-year planning period; (2) ponds average one-quarter acre in surface area; (3) the evaporation rate from surface water equals the summertime peak rate of one-quarter inch per day; (4) water would remain in the pond for 48 days.

4.4.6.1 Common to All Alternatives

Two types of adverse impacts on wildlife are common to all alternatives: displacement and habitat fragmentation. However, these two adverse impacts vary in degree by alternative. Displacement from surface disturbing or disruptive activities moves animals into less desirable habitat and creates competition for available resources with other species and uses. Wildlife displacement can be either direct or indirect, depending on the amount and type of activity.

The amount of land used for road surfaces, well pads, stock tanks, and any recreation facilities represents a direct loss of wildlife habitat. The actual effect from surface disturbing and disruptive activities in desert areas void of tall stands of vegetation or dramatic topographic relief is greater than the direct loss of acreage indicates. Wildlife habitat loss results from road construction and road use, facility construction and placement, pipeline construction, field facility maintenance, ROW construction, range improvement construction, and disturbance zones around these areas. All disturbed acreages would not be fully reclaimed to their predisturbance structure and density, and portions, particularly in shrub communities and stabilized sand dunes, would remain unavailable as habitat for wildlife for more than 20 years. The basin big sagebrush/lemon scurfpea community habitat would likely take up to 70 years to reach the structure and density of predisturbance conditions. Limited rainfall, poor soils, and severe

winter conditions make reclamation difficult, increasing the time required to reestablish suitable vegetation to predisturbance composition and density.

Activities in desert-type terrain tend to displace wildlife, particularly big game species by distances of more than 3 miles because of extended sight distances and lack of security cover. The loss of adjacent habitats because of disturbance or habitat degradation is much more subtle but has been observed and documented.

Elk have been shown to avoid disturbance by distances of upwards of 1.25 miles from active oil and gas wells (Gussey 1986; Powell 2003; WGFD 2000), upwards of 2.4 miles from construction of drill sites (Hayden-Wing Associates 1990), and upwards of 1.25 miles from major roads (Powell 2003). Disturbance was also avoided or reduced by topographic visual barriers between the source of disturbance and the elk (Irwin and Gillin 1984; Ward 1986; Olson 1981; Kuck et al. 1985; Van Dyke and Klein 1996). This disturbance is usually temporary in nature, however, and some studies have shown that elk returned to the area of disturbance once the source of disturbance and human presence was gone (Gussey 1986; WGFD 2000), albeit at 50 percent of previous levels in forested environments (Hayden-Wing Associates 1990). Studies particular to oil and gas activities have shown that elk tolerate some level of operating wells and associated facilities as long as human presence is absent or cover is available in the vicinity of the well site (Gusey 1986; Beak Consultants 1979; Bennington et al. 1982; Hayden-Wing Associates 1990).

Van Dyke and Klein (1996) found that elk showed no shift in home range between the pre and post drilling of a single oil well with all roads closed to other traffic and remote monitoring during sensitive periods (winter and parturition). However, they shifted their use of core areas out of view of the drill pad during both periods, there was increased intensity of use in core areas after drilling, and there was a slightly reduced use of total home range. Van Dyke and Klein concluded that if drilling occupied a relatively small amount of home range, elk were able to compensate by shifting areas of use.

Kuck et al. (1985) showed that persistent disturbance weakened the tendency of elk to return to the disturbed area and that selection of lesser quality habitat occurred. However, abandonment of the traditional calf-rearing habitat did not result in abandonment of calves or a difference in survival rates between disturbed and control groups. The study also found that there were no data to suggest that elk habituated to mining noises. Johnson and Wollrab (1987) found that elk distribution changed during gas exploration and field development through the abandonment of winter and calving habitat and changes in range. They discovered that although elk returned to disturbed sites, populations were lower (sometimes less than half), and the use of the habitat was unpredictable.

When studying elk response to roads, Lyon and Ward (1982) found that elk (in a forested environment) moved from 0.24 to 1.8 miles, depending on the amount and type of traffic, road quality, and adjacent cover density. Generally, road avoidance has been reported to be greater in areas of open vegetation with less adjacent cover (Perry and Overly 1976; Lyon 1979), in shrub lands rather than in pine forests and juniper woodlands (Rost and Bailey 1979), and in areas with increased density of high-quality roads (Hershey and Leege 1976).

A JMH Desert Elk Study was initiated in 1999 to better understand the effects of human disturbance on elk behavior and habitat use within the planning area. The findings of this study are outlined in Section 3.1.6.1.3 and include the following: Elk typically avoided habitats offering little security cover; topography and screening cover by vegetation are important during daylight hours for providing security cover; habitat use patterns within the planning area are strongly influenced by roads, which cause habitat loss much greater than the actual road “footprint”; human disturbance leads to increased daily movements of disturbed elk and reduced elk use in traditional calving areas (Powell 2003).

Significantly fewer studies have been conducted on the effects of human disturbance, particularly from roads and/or oil and gas development, on mule deer and pronghorn antelope. Because of this, possible effects on these species are not well understood. Rost and Bailey (1979) found that mule deer avoid roads by up to 200 meters (0.12 miles) and that road avoidance was greater where roads were more traveled and in shrub versus forested habitats. There are no known published studies on pronghorn antelopes' reactions to roads; however, it has been documented that woven wire ROW fences along roads impede or block antelope movement, resulting in fragmentation of habitat (Deblinger 1988; Bruns 1977) and pronghorn deaths due to reduction or elimination of access to severe winter relief range.

Hiatt and Baker (1981) examined the effects of a single well installation on winter distributions of elk and mule deer. They found that both species avoided the drilling site during drilling but did not avoid the access road. They also examined vegetation present at the well location and concluded that shifts in usage were not the result of differences in vegetation. Easterly et al. (1991) examined winter distribution of and habitat use by pronghorn and mule deer within a petroleum production complex and found that pronghorn used four of six oil fields in proportion to their availability and that mule deer used five of six oil fields in proportion with their availability. Two of the most active oil fields were used less than expected by pronghorn given their availability, and no mule deer were observed within one of the most active oil fields. Easterly et al. concluded that there was continued use of winter range by pronghorn and mule deer after construction of an oil and gas field.

It is generally agreed that once disturbance reaches a certain threshold, impacts become significant. Further study and monitoring are needed to determine the threshold for the planning area.

Habitat fragmentation occurs when a contiguous habitat is broken up (fragmented) by disturbing activities, causing a reduction in usable ranges and the isolation of smaller, less mobile species; a loss of genetic integrity within species or populations; and an increase in the abundance of habitat generalists that are characteristic of disturbed environments (i.e., competitors, predators, and parasites) (Harris 1998). The primary factor affecting wildlife species (especially big game) within the planning area is the reduction in usable habitat and the disruption of migration corridors that link crucial habitat (winter range) and parturition areas. This would occur particularly in areas with many access roads and surface disturbances. Transportation routes tend to fragment habitats and can act as barriers to some species, especially in severe winter conditions. This could also increase public access to areas that previously had been relatively inaccessible to vehicles during the winter and spring. This would become more important and would increase adverse effects on wildlife as demands for use of public lands increased. Migration routes could be altered or eliminated, changing some traditional use patterns on a local level. Seclusion areas for wildlife would become smaller and more dispersed in some areas. Increased oil and gas activity, especially in areas with reduced well spacing (40- and 80-acre spacing), would preclude use of some of these areas by wildlife species, especially deer and elk. Existing leases within the planning area might not provide the specific mitigation measures needed to protect important wildlife habitats. In specific cases in which stipulations would not be adequate to protect habitat, COAs for APDs could be applied. These would be based on site-specific analysis and would establish specific necessary mitigation measures not covered by stipulations for resource and environmental protection. BLM specialists would review sensitive resources with lease operators to develop and implement protection measures to allow for effective development operations where impacts could be avoided or mitigated. Depending on the economics of the industry at the time, it is possible that developers could claim an economic hardship and therefore not have to implement recommended mitigation measures. Greater sage-grouse populations have been declining over the last half of the century due to such factors as habitat degradation, fragmentation, and loss (see Chapter 3). As oil and gas development has increased in Wyoming, so has the concern over how this type of development might affect greater sage-grouse populations. Potential impacts of fluid mineral development on greater sage-grouse populations include direct habitat loss from well, road, pipeline, and transmission line construction; increased human activity and associated pumping

noise causing displacement; increased legal and illegal harvest; and direct mortality associated with evaporation ponds and increased exposure to predation (Braun 1986; TRC Mariah Associates Inc. 1997).

A study of greater sage-grouse of the Pinedale Mesa near Pinedale, Wyoming, was conducted by Lyon in May 2002 to examine the effects of natural gas and oil development on the productivity, general movements, and habitat use of greater sage-grouse. The results of the study indicated that hens captured on disturbed leks demonstrated lower nest initiation rates; traveled twice as far to nest sites; and selected, for height, greater total shrub canopy cover and live sagebrush canopy cover than did hens captured from undisturbed leks. Lyons concluded that extreme early brood survival appears to be the limiting factor in greater sage-grouse population stability on the Pinedale Mesa and suggested that disturbances (i.e., noise and predation) associated with well drilling and road traffic during breeding might result in reduced nest initiation rates and could be causing lower brood survival.

Other studies conducted on greater sage-grouse indicate that noise might be adversely affecting strutting and nesting grouse; however, the degree of impact is unknown at this time (LaGory et al. 2001; Dantzker et al. 1999).

As documented in Chapter 3, greater sage-grouse nesting and wintering habitat requirements are quite specific. If this habitat were disturbed, it could require in excess of 20 years to restore affected habitat to predisturbance conditions. During this time, however, opportunities might exist to enhance remaining vegetation and habitat characteristics to provide more suitable habitat than currently exists. If that could not be accomplished, there would be a net loss of habitat function and adverse impacts on greater sage-grouse habitat during the planning period.

The health of fisheries within the planning area is directly related to the overall health and functional capabilities of riparian resources, which in turn are a reflection of watershed health. Any activities that affected the ecological condition of the watershed and its vegetative cover would directly affect the aquatic environment. It is assumed that any substantial disturbance to the soils or changes in vegetative cover would have an adverse effect on watershed health and water quality and would therefore have an adverse effect on associated fisheries. The degree of impact attributed to any one disturbance or series of disturbances would be influenced by location within the watershed, time and degree of disturbance, existing vegetation, and precipitation. Surface disturbances result in accelerated erosion and runoff, increasing stream flow and sediment and nutrient loads to local channels. Sedimentation of a given channel can impact fisheries by reducing habitat complexity, which results in a lower diversity of prey organisms. Increased turbidity also results from increased sediment input, which decreases light penetration and inhibits visual predation by fish. Surface disturbance near streams that results in substantial removal of riparian vegetation can increase current velocity, which puts additional strain on fish and reduces nutrient cycling. In addition to increased sediment input, streambank disturbance can impact fisheries by creating bank instability, which can alter flow and destroy pool-riffle formations necessary for fish survival. Increased nutrient loading of streams can impact fisheries by increasing primary production above natural levels, which degrades habitat and decreases oxygen levels. Because any impact on natural water resources is also an impact on fisheries, impacts to fisheries can be inferred from Section 4.4.2, which discusses impacts on riparian areas and water quality.

Oil and natural gas production could result in the use of pits to separate oil from produced water or to evaporate large volumes of water with high levels of total dissolved solids (TDS). Birds are attracted to these pits because they mistake them for natural bodies of water. The sticky oil then entraps the birds in the pits and they die from exposure and exhaustion. Birds that do manage to escape can die from starvation or experience impaired reproduction caused by the toxic effects of oil ingested during preening. Scavengers and predators can also suffer adverse effects from consuming oiled birds. Pits or ponds containing hypersaline water can pose a mortality threat to migratory birds through ingestion of toxic

brine, susceptibility to avian botulism, and sodium crystallization on feathers, which destroys thermoregulatory and buoyancy functions. A study of bird mortality in oil pits in Wyoming conducted by Brent J. Esmoil for the University of Wyoming demonstrated that deterrents such as flagging, strobe lights, metal reflectors, and noisemakers were not effective at preventing bird mortalities in these pits. Esmoil did not find any mortality in pits completely covered by netting or by wire mesh sufficiently small enough to prevent songbirds from falling through the wire (USFWS 2003). It is BLM standard practice that pits containing harmful fluids be maintained in a manner that prevents migratory bird mortality, thus eliminating potential effects.

There is a potential for additional strain on forage resources within portions of the planning area (south-central) from concentrations of grazing animals. Heavy concentrations of grazing animals could result in overutilization of vegetation. However, monitoring and evaluation of habitat to comply with the Wyoming Standards for Healthy Rangelands should provide information on vegetation resources before impacts became significant.

The management of heritage sites would indirectly benefit wildlife through preservation of potential habitat and general habitat characteristics. Disturbance and removal of vegetation could occur through activities related to management of heritage resources; however, any impact would generally be limited to relatively small areas. Even under the most intense management (i.e., excavation), the amount of habitat disturbed would be very small, but this still could have significant impacts on small animals (e.g., pygmy rabbits, a BLM sensitive species) occupying those areas.

Watershed management would provide benefits to wildlife by maintaining or restoring habitat conditions through the establishment of DPC objectives, placement of buffer zones around riparian areas, and restrictions on surface disturbance within riparian areas and floodplains. Actions that would maintain or improve watershed conditions would generally benefit the ecological condition of wildlife habitat.

The management protections afforded to special management areas would generally result in beneficial impacts on wildlife. Protections aimed at conserving vegetation, and limitations on surface disturbing activities, would benefit wildlife by enhancing overall habitat conditions.

4.4.6.2 No Action Alternative

Prescribed fire as a vegetation treatment in the planning area could benefit many wildlife habitats because it aids in regeneration of some tree and shrub species and allows for additional wildlife forage. Adverse effects of prescribed fire on wildlife habitat include forage overutilization by big game species after treatment of aspen stands. Conversions of shrubs to grassland using prescribed fire also would result in a direct loss of cover and food for many species (such as small mammals, greater sage-grouse, and big game). The effects of loss of cover could be long-term, particularly since sagebrush can take more than 20 years to reach the appropriate canopy cover height and spacing needed for some sagebrush-dependent species. Greater sage-grouse are particularly susceptible to loss of cover from fire activities because of the relationship between their breeding, brood-rearing, and wintering habitat and sagebrush. Significant long-term adverse impacts on greater sage-grouse habitat could occur if large acreages were burned. No prescribed fires would be allowed within the basin big sagebrush/lemon scurfpea vegetation association under this alternative; therefore, effects on wildlife dependent on this association would not occur.

Watershed management would provide benefits to wildlife by maintaining or restoring habitat conditions through the establishment of DPC objectives, placement of buffer zones around riparian areas, and restrictions on surface disturbance within riparian areas and floodplains. Actions that would maintain or improve watershed conditions would generally benefit the ecological condition of wildlife habitat.

Wild horses currently occur in the planning area outside the identified HMAs, which will continue despite gathering efforts. This compounds problems associated with limited water sources and big game crucial habitat (winter range). Wild horses concentrate in the core area during the summer months and compete with big game for available forage during winter months (November through March). With livestock competition for available water and forage added to wild horse competition, adverse impacts on big game would be expected. All water developments within sensitive wildlife habitats would be in conformance with wildlife objectives. Adverse impacts in the planning area due to wild horses would also be minimal provided that the numbers of horses were kept at plan objective levels and that the herd was maintained within the HMA.

The effects of livestock grazing on wildlife would be minimal because actions undertaken to improve rangeland and riparian habitat (livestock water developments, exclosures, fencing, and conversions) must meet the Wyoming Standards for Healthy Rangelands (Appendix 10). Forage utilization levels would be evaluated on a case-by-case basis and would consider habitat conditions and forage for livestock, wildlife, and wild horses. Water developments could benefit wildlife by providing additional sources of water but could also adversely impact wildlife habitat, particularly in sensitive habitats, through possible reductions in forage and cover due to increased distribution of animals. However, implementation of the Wyoming Standards for Healthy Rangelands would ensure that impacts were not significant. Adverse impacts of fences on wildlife within the planning area would be minimal because of requirements that they be located so as not to impede wildlife movement and that they be removed, modified, or reconstructed where documented conflicts with wildlife occurred. Future livestock conversions (sheep to cattle or vice versa) would be carefully analyzed. Sustainability reviews would be required before conversions, which would benefit range.

It is estimated that 23 livestock pits, ponds, and water wells might be created or rebuilt in the planning area. Each one of these water developments would be assumed to cause a depletion to the Colorado and Platte River systems. Water depletions are important because the water from portions of the planning area is part of the habitat for endangered fish, wildlife, and/or plant species downstream from the project area in the Colorado and Platte River systems. It is assumed for analysis purposes that all water used for livestock pits, ponds, and water wells within the Green River and Sweetwater River Basins would have contributed to the surface flows of the Colorado or Platte Rivers or their tributaries. In addition, of the 23 water developments to be constructed, 19 would be in the Green River Basin (Colorado River) and 4 would be in the Sweetwater River Basin (Platte River). Using 5 acre-feet per water development over the 20-year planning period, average annual depletions anticipated by these actions would not exceed 4.75 acre-feet for the Colorado River system and 1 acre-foot for the Platte River system after all developments were installed.

Protection of special status plant species would benefit wildlife habitat through restrictions on surface disturbing and disruptive activities. Reduction of invasive species, achieved by requiring provisions to reduce and control such species, would also benefit wildlife by maintaining the quality of habitat.

OHV use is expected to increase because of improvements in the facilities near the Greater Sand Dunes Recreation Area, increased interest in the planning area, and increased access due to development activities. Estimated recreation activity is discussed in detail in Section 4.7. The majority of OHV use would occur within the Greater Sand Dunes Recreation Area; however, activity is also expected throughout the planning area. No significant impacts on wildlife (specifically, elk, mule deer, antelope, greater sage-grouse, and raptors) are expected from OHV use because of the ability to place seasonal restrictions on OHV users (Map 9) at crucial times in sensitive habitats; seasonal closure of Steamboat Mountain; limitation of access to designated roads and trails in the Steamboat Mountain ACEC; and the fact that the majority of OHV use in the planning area would occur in the summer and fall (June through October), a time when wildlife would be the least sensitive to human disturbance. However, OHVs

would have localized adverse impacts on wildlife through disturbance caused by human presence, a small amount of surface disturbance, and noise. Additional areas of seasonal restrictions could be implemented as needed to reduce adverse impacts. Geophysical exploration activities could have similar effects. However, effects would be reduced by implementing seasonal restrictions and by conforming to OHV designations.

Recreation activities (camping, hiking/biking, recreational mining) in the planning area would be expected to increase steadily throughout the planning period. Impacts on wildlife from recreation activities would have localized adverse impacts on wildlife through disturbance caused by human presence, and a small amount of surface disturbance. It is unknown whether these impacts would be short or long term.

Hunting activity in the planning area has been shown to have short-term adverse effects on big game, and most likely all wildlife, in the planning area because of an increase in human activities and disturbance (Powell 2003). Hunting is expected to remain constant under this alternative; therefore, the level of short-term disturbance from increased human activity would remain the same.

Wildlife could experience adverse impacts from development in the form of surface disturbance. Greater sage-grouse leks, wetlands, riparian areas, and floodplains are within the controlled surface use category; this limits most surface disturbing activities within one-quarter mile of a lek and within 500 feet of wetlands, riparian areas, or floodplains (Map 7). Raptor nesting sites are within the NSO category, which limits all surface disturbance to that site and limits permanent or high-profile structures within a specified distance. Seasonal limitations for reduction of disturbance are applied within one-half mile to 1 mile of the nesting site, depending on the species of raptor. Such limitations are also applied within greater sage-grouse winter concentration areas, within 2 miles of greater sage-grouse leks, and within big game crucial habitat and parturition areas. These restrictions would reduce adverse impacts on these species during important times of their life cycle; however, they would not prevent further habitat destruction from occurring, which might result in the selection of suboptimal habitats. It is assumed that greater sage-grouse populations would continue to decline under this alternative because the management of their habitat would be insufficient for recovery or stabilization of populations in the planning area. It is unknown whether the continued population decline of greater sage-grouse in the JMH CAP planning area would lead to a need to list the species and, therefore, result in a significant impact. ROWs (such as pipelines and power lines) could adversely affect wildlife habitat because of the disturbance of associated roads, increased access, and associated displacement caused by human presence. Many of these alterations of habitat favor predators, thereby increasing predation of species such as the greater sage-grouse. Although companies might not need to travel pipeline routes, removal or crushing of vegetation would allow increased access for recreationists, causing further intrusion into wildlife habitat and increased disturbance. Currently, numerous two-track-type roads access almost all parts of the planning area, although they are used primarily seasonally during hunting (Powell 2003). Aboveground pipelines would have less adverse impact on crucial wildlife habitats (big sagebrush, mountain shrubs, woodland habitats, stabilized sand dunes); however, they would pose a threat to public safety, primarily to OHV users. ROW impacts on greater sage-grouse leks and other sensitive wildlife habitat in the South Pass, Greater Sand Dunes, and Steamboat Mountain ACECs would be reduced because of these areas' designation as avoidance areas (Map 8). All other wildlife habitats would be subject to ROW designation and associated impacts. Adequate mitigation (barriers, culverts, revegetation, etc.) would be implemented to reduce impacts.

Communication sites and related access, when located in sensitive habitat, would have significant impacts on species occupying those habitats. Access to these sites occurs year-round. Year-round access could result in plowing of roads that would displace wintering wildlife, which would add to the stress caused by winter conditions and would disrupt parturition and nesting. Plowing of these roads would also allow

more recreational traffic to use these areas during times when they previously would not have been accessible. The Steamboat Mountain ACEC would be closed to communication sites, which would minimize adverse impacts on sensitive habitats in that area.

New road development increases use by recreationists and other public land users, increasing the amount of human presence and the potential for harassment and illegal taking of wildlife in the area. Very limited activity currently occurs in the area from November to June because of the lack of access and lack of snow removal. Closing roads during crucial winter periods would help limit disturbance to wildlife and retain a limited level of activity.

Closing the core area to leasing of fluid minerals would protect approximately half of the most sensitive habitat of wildlife species, particularly big game (elk and mule deer), that inhabit the planning area (Map 51). The other half of the core area consists of existing leases that would be reinstated, allowing fluid mineral leaseholders to drill (see Common to All Alternatives section above for existing lease discussion). Leases outside the core area would also be reinstated, and new leases would be offered in the remainder of the planning area subject to stipulations such as surface disturbance limitations, timing and access restrictions, protection of special resources, and NSO designations.

Approximately 221 oil and gas wells (exploration, discovery, production) would be drilled over the planning period: 19 wells per year for the first 4 years, with drilling steadily decreasing through the rest of the planning period to 8 wells per year as producing wells played out. All drilling could occur throughout the planning area, except in nonleased portions of the core area and WSAs; however, it is likely that drilling would occur mostly on existing leases for the first few years of development. The phase of fluid mineral activity most disturbing to wildlife is drilling because of the large amount of human disturbance from the creation of access roads, surface disturbance from the well pads (approximately 3 acres), noise from the rig during drilling, and overall human presence. This phase of activity lasts approximately 1 to 4 months per well depending on the depth of the well. All wells not put into production would be reclaimed through implementation of a reclamation plan. Production wells that played out after an estimated 30 years would also be reclaimed. However, full restoration of some habitats would not occur for more than 20 years (as described in Section 4.4.6.1).

Big game would experience adverse effects from fluid mineral development, resulting in possible avoidance (up to 1.25 miles) of areas disturbed by drilling, including roads. Possible disruption of migratory corridors could also occur. The level of adverse effects, however, would depend on where the activity occurred within the planning area. Existing leases within the planning area are spread throughout the majority of the area. If development of 19 wells per year for the first 4 years of development were dispersed throughout the planning area, adverse effects on big game could be minimal if suitable, sufficiently large alternative habitats existed. If development were concentrated within the high development potential area, which includes the core area, adverse effects on big game would be significant because any loss of function or value of habitats considered as vital and high by the WGFD is considered a significant impact. Concentrated development in this area would reduce available habitat and would likely disrupt migratory corridors. As development declined throughout the planning period after the first 4 years, adverse effects on big game would slowly be reduced and gradual replacement of habitat from restoration activities would occur.

Mountain plover and greater sage-grouse could also experience adverse impacts from fluid mineral development because of the creation of perches for raptors that prey on each species. Minimization measures for these impacts could include adding pointed conical covers on smoke stacks and plugged well markers; burying power lines; using the lowest possible structures for fences, condensate storage, and other elevated structures; and incorporating perch inhibitors into these structures' design.

It is estimated that two coalbed gas exploration projects, with a total of 50 wells, would be drilled within the planning area (but outside of the core area) during the planning period. Impacts on wildlife, particularly on big game, are expected to be similar to those for oil and gas wells. Because coalbed gas wells are drilled in a "pod" formation for dewatering purposes, with approximately 25 wells per pod, impacts are expected to be significant (depending on the location of the development and the wildlife species and/or habitats occurring in the area) and localized but might not affect as much acreage as traditional oil and gas well development.

Drilling and completion activities for oil, gas, and coalbed gas wells would use local water sources and would therefore deplete water in portions of the planning area that are part of the habitat for threatened and endangered species downstream from the project area in the Colorado River and Platte River systems. It is assumed for analysis purposes that all water used for drilling and completion of wells within the Green River and Sweetwater River Basins would have contributed to the surface flows of the Colorado or the Platte River or their tributaries. In addition, of the 221 oil and gas wells to be drilled, 95 percent would be in the Green River Basin (Colorado River), and 5 percent in the Sweetwater River Basin (Platte River). All coalbed gas wells (50) would be in the Green River Basin.

Using 1.5 acre-feet of water per well, depletions from these actions would total approximately 390 acre-feet in the Colorado River system and 16.5 acre-feet in the Platte River system. Based on a 20-year time span, the average annual depletion for the two systems would be 19.5 acre-feet and 0.83 acre-feet, respectively. The depletion of water from the Colorado and Platte River systems and its effect on threatened and endangered species downstream are described in the Biological Assessment (Appendix 3) for this document.

Locatable mineral activity on existing active claims in and around northern parturition areas has the potential to decrease the usability of these areas for calving and fawning. This particularly applies to activities that might occur in or near aspen stands associated with deer and elk parturition areas, although some of the aspen stands would be withdrawn as part of the South Pass Summit. These areas are also important to a variety of birds and other wildlife and are rare habitat types in the planning area. Although current exploration activities are seasonal, with little or no activity during the winter, mining activities could continue at the current rate, or even increase during the fawning and calving periods, causing displacement of animals. There is limited information available on the likelihood of other locatable mineral development (such as commercial diamond or gold mining) in the planning area. If exploration activities found there was potential for this development, a plan of operation would have to be filed that specified how mining would be conducted without permanently impacting other resources. Reclamation plans would also have to be developed, and bonds posted to ensure that mined lands were reclaimed.

The planning area would be open for consideration of mineral material sales except in raptor nesting sites, South Pass Summit, WSAs, the Greater Sand Dunes ACEC, and the Steamboat Mountain ACEC (Map 12). Closing these areas to mineral material sales would benefit a portion of wildlife habitat; however, a large portion of crucial habitat (winter range) and parturition areas for big game are outside these areas. These provisions also would not protect greater sage-grouse nesting habitat. This activity is therefore likely to cause localized adverse impacts on wildlife through the disturbance of habitat. Reclamation would occur, but full restoration of some habitats would not occur for more than 20 years (Section 4.4.6.1).

Coal and sodium exploration would be allowed within the planning area on a case-by-case basis (with mitigation for protection of sensitive resources) except in wetlands, riparian areas, floodplains, raptor nesting sites, the Steamboat Mountain ACEC, and within one-quarter mile of greater sage-grouse leks (Map 11). Effects of this exploration on wildlife habitat are expected to be minimal because of the small amount of surface disturbance associated with exploration and because of the mitigation included in

proposals, which could include seasonal limitations, restricted access to existing roads and trails, and full reclamation.

Only federal coal lands within the Coal and Sodium Occurrence and Development Potential Area would be open to consideration of leasing (Map 6). Overall, this would reduce adverse effects on wildlife habitat from coal leasing. In addition, a portion of the Greater Sand Dunes ACEC would be closed to leasing within this area. Raptor nesting sites (with a one-half- to 1-mile buffer) and the Steamboat Mountain ACEC would be open to coal leasing with subsurface mining and controls on surface facilities, further minimizing adverse impacts on wildlife. Additional measures would be implemented for maintenance of adequate big game habitat. Overall, coal leasing is expected to have negligible impacts on wildlife because the projected demand for developing this resource in the planning area is minimal.

The federally listed black-footed ferret may occur within the planning area and could be affected by management actions, but would likely not be adversely affected. The species could be affected because of the amount of surface disturbance and human activity associated with management of the planning area. However, no adverse effects are expected to occur, because of required surveys for these species before any surface disturbance activities and subsequent protection measures developed by BLM in conjunction with FWS should a ferret be found. There are no expected effects on the bald eagle, gray wolf, grizzly bear, or the western population of the yellow-billed cuckoo from management of the planning area, because of a lack of suitable habitat or their occurrence as a casual migrant.

Potential effects on the Wyoming BLM sensitive species mountain plover and greater sage-grouse are discussed above. It is unknown whether adverse impacts on other Wyoming BLM sensitive species would occur because of a lack of information on habitat locations and requirements within the planning area. Searches for these species would be required in any potential habitats for the species before approval of any project or activity in those areas. If any of these species were found, mitigation measures would be species-specific and determined on a case-by-case basis.

4.4.6.3 Alternative 1

Effects of prescribed fire (vegetation treatment) would be the same as those under the No Action Alternative, except that use would be decided on a case-by-case basis, which could cause greater or lesser effects than those described for the No Action Alternative. Impacts of wild horses on wildlife habitat would be the same as those under the No Action Alternative.

Effects of watershed management actions would be the same as those under the No Action Alternative, except that these beneficial impacts would be greatly reduced under this alternative because there would be fewer restrictions on surface disturbing activities and smaller buffer zones around riparian areas and floodplains.

The anticipated use of livestock AUMs would increase over the planning period to the full permitted active use amount, which is approximately double the historic use. This would increase grazing pressure on forage resources, potentially having an adverse impact if the long-term productivity of the range were compromised. This additional impact would be realized only on allotments that were not currently close to fully utilizing their permitted AUMs. Other impacts of livestock grazing on wildlife habitat under this alternative would be similar to those under the No Action Alternative, except that fences would only be modified or reconstructed (not removed) where documented wildlife conflicts with fencing occurred. Existing exclosures could be removed and made available for livestock grazing. New exclosures would not be considered unless they benefited commodity uses. This has the potential to adversely affect wildlife through potential loss of habitat from overgrazing of particular areas. Effects on the habitat of endangered fish, wildlife, and/or plant species in the Colorado and Platte River systems from water

depletions resulting from construction of livestock water developments would be the same as those under the No Action Alternative.

Designating special status plant species communities (primarily Wyoming BLM sensitive species) as avoidance areas rather than exclusion areas could reduce the benefit of protection of wildlife habitat described under the No Action Alternative. The effects of reduction of invasive species on wildlife habitat would be the same as under those the No Action Alternative.

OHV use is expected to increase because of increased interest in the planning area and increased access due to development activities; however, use would be slightly less than under the No Action Alternative (Section 4.7, Recreation Resources). The majority of OHV use would occur within the Greater Sand Dunes Recreation Area; however, activity is also expected throughout the planning area. Although OHV use is expected to be less than under the No Action Alternative, adverse effects on wildlife habitat are expected to be greater because of a lack of seasonal restrictions on the majority of habitats (big game, greater sage-grouse winter range). Although raptors still would have seasonal restrictions associated with nesting sites, the seasonal buffer around the site would be reduced to one-quarter mile instead of the one-half to 1 mile discussed in the No Action Alternative. Mountain plover would be afforded increased protection under this alternative compared with the No Action Alternative because of seasonal limitations on mountain plover aggregation areas. Greater sage-grouse seasonal protection would be reduced to potential nesting habitat within 1 mile of leks, increasing possible disturbance to nesting activities from OHV use.

Hunting activity is expected to be greater than under the No Action Alternative over the planning period because of increased development and resulting animal dispersion. Adverse effects on wildlife would be short term, as described in the No Action Alternative.

The overall adverse effects of surface disturbing activities on wildlife habitat would be much greater than under the No Action Alternative because of a lack of seasonal restrictions on sensitive wildlife habitat except for greater sage-grouse nesting habitat buffers (1 mile), raptor nest sites buffers (one-quarter mile), and mountain plover aggregation areas (Map 16). Depending on the location and timing of activities, it is likely that lack of seasonal restrictions on big game habitat would cause long-term displacement from crucial habitat and parturition areas, resulting in a potentially significant effect. It is assumed that greater sage-grouse populations would continue to decline under this alternative because the management of their habitat would be insufficient for recovery or stabilization of populations in the planning area. Because the greater sage-grouse is a BLM sensitive species, any loss of habitat function or value constitutes a significant impact. Also, the birds are classified by the WGFD as “vital,” and any increased mortality or decreased survival would be considered a significant impact. This alternative would result in significant impacts on the birds.

Effects of ROWs on wildlife habitat would be greater under this alternative than under the No Action Alternative because of the removal of Steamboat Mountain ACEC as a ROW avoidance area (Map 18). The only protection given to wildlife from ROWs would be the designation of greater sage-grouse leks with one-quarter-mile buffers as ROW avoidance areas. All other wildlife habitat would be open to ROWs. A lack of transportation planning under this alternative would also increase adverse effects on wildlife habitat, particularly big game, because of lack of control over access at all times of the year. This would result in significant impacts on greater sage-grouse, elk, and mule deer.

Geophysical exploration and detonation, and coal and sodium exploration activities (Map 21), under this alternative could have significant adverse effects on wildlife habitat, except in WSAs, because of a lack of seasonal restrictions protecting big game crucial habitat (winter range) and parturition areas. Powell’s study showed very limited use of the WSAs by elk except as hiding cover during the hunting season.

Effects could include displacement due to the noise associated with disruptive activities, surface disturbance, possible abandonment of habitat during parturition periods, and additional stress on big game populations during winter periods.

Effects of communication sites would be the same as those described under the No Action Alternative; however, the Steamboat Mountain ACEC would be open to consideration for communication sites, which would increase adverse effects on wildlife habitat. Such activity could cause elk and mule deer to abandon the majority of their crucial winter range and parturition habitat, therefore resulting in significant impacts.

The entire planning area, except WSAs, would be open to fluid mineral leasing (Map 20). The Hydrocarbon Occurrence and Development Potential Report (Appendix 13) assumes that a total of 264 oil and gas wells would be drilled over the planning period: 21 wells per year for the first 4 years, with drilling steadily decreasing thereafter to 10 wells per year as producing wells played out. Depending on the timing and location of oil and gas development, this expected level of development would have significant impacts on wildlife. Effects under this alternative would be significant because of lack of protection from leasing in the core area and lack of stipulations on new leases that would protect big game and other sensitive wildlife through minimal seasonal limitations.

Mountain plover and greater sage-grouse are expected to experience adverse impacts from fluid mineral development because of the creation of perches for raptors that prey on these species. Mitigation of this effect would include the following measures: constructing pointed conical covers on smoke stacks and plugged well markers; burying power lines or including perch-inhibitors in their design; using the lowest possible structures for fences, condensate storage, and other elevated structures; and incorporating perch inhibitors into such structures' design.

Effects of coalbed gas and locatable mineral development on wildlife habitat would be the same as those described under the No Action Alternative, except that the Greater Sand Dunes ACEC would not be withdrawn from mineral location under this alternative.

Assuming a total of 264 oil and gas wells, with the remaining assumptions being the same as those for the No Action Alternative, water depletions from oil, gas, and coalbed gas wells under this alternative would total approximately 451.5 acre-feet in the Colorado River system and 19.5 acre-feet in the Platte River system. Based on a 20-year time span, the average annual depletion for the Colorado River system and the Platte River system would be 22.5 acre-feet and 0.98 acre-feet, respectively. The depletion of water from the Colorado and Platte River systems and its effect on threatened and endangered species downstream is described in the Biological Assessment (Appendix 3) for this document.

Effects of mineral material sales on wildlife habitat under this alternative would be greater than those under the No Action Alternative because of increased demand from activities and decreased restrictions. Greater sage-grouse winter range and nesting habitat, mountain plover aggregation areas, and large portions of big game crucial winter range and parturition areas would be subject to mineral material sales; therefore, adverse impacts on these habitats are expected, even with implementation of reclamation practices, because of the sensitivity of these habitats.

Effects on wildlife habitat from federal coal lands within the Coal and Sodium Occurrence and Development Potential Area would be greater than those under the No Action Alternative because of a lack of protection for wetlands, riparian areas (considered "vital" and "high" by WGFD), and floodplains, and the removal of the ACEC designation from Steamboat Mountain. This would result in a significant impact.

Impacts on federally listed and candidate species would be the same as those described under the No Action Alternative. Impacts on Wyoming BLM sensitive species would be greater than under the No Action Alternative because of a lack of nondiscretionary protection measures specific to these species. This would result in a significant impact.

Of the five alternatives, this alternative would likely have the greatest adverse impacts on wildlife. Many of these impacts would be significant.

4.4.6.4 Alternative 2

Impacts on wildlife habitat from the management of special status plant species and hunting activities would be the same as those under the No Action Alternative. Impacts on Wyoming BLM sensitive species would also be the same as those under the No Action Alternative; however, additional protection would be provided for mountain plover aggregation areas, with one-quarter-mile buffers, and for greater sage-grouse winter range, through their designation as NSO areas.

Prescribed fire (vegetation treatment) would have less adverse impact on wildlife cover under this alternative than under the No Action Alternative because prescribed burns would not be considered. Benefits to wildlife forage, other than treatment of noxious weeds, from prescribed fire would not occur under this alternative. Effects of wildfire on the basin big sagebrush/lemon scurfpea association would be greater than under the No Action Alternative because of limited fire suppression activities, possibly resulting in adverse effects on big game because of this association's role as a crucial habitat and parturition area.

The effects of watershed management actions would be the same as those under the No Action Alternative, although these beneficial impacts would be greater under this alternative because of increased restrictions on surface disturbing activities and larger buffer zones around riparian areas and floodplains.

This alternative would reestablish the boundaries of the Divide Basin Wild Horse HMA to exclude the JMH CAP planning area. A gathering plan would be developed and implemented to remove wild horses from the planning area and to maintain the AML within the reestablished boundaries of the HMA outside the planning area. Until reestablishment of the HMA boundaries and gathering of excess wild horses, impacts on wildlife habitat would be similar to those under the No Action Alternative. Constructing a fence to exclude wild horses from the planning area could affect migrating wildlife because of habitat fragmentation; however, adhering to BLM design standards for fence construction should minimize this effect. Removal of wild horses from the planning area would also increase forage and water sources for wildlife because of less competition among wild horses, livestock, and wildlife.

Although livestock operators could increase AUM use to the fully permitted amount, anticipated use of AUMs would be similar to historic levels. Effects of livestock grazing on wildlife habitat under this alternative would be similar to those under the No Action Alternative, except that exclosures and water developments would be allowed in sensitive wildlife habitat only if they preserved sensitive resources or improved habitat and resource conditions.

It is estimated that 11 livestock pits, ponds, and water wells might be created or rebuilt in the planning area under this alternative. Of these 11 water developments, 9 would be in the Green River Basin (Colorado River) and 2 would be in the Sweetwater River Basin (Platte River). Using 5 acre-feet per water development over the 20-year planning period, the average annual depletions anticipated to result from these actions would not exceed 2.3 acre-feet for the Colorado River system and 0.5 acre-feet for the Platte River system after all the developments were installed.

OHV use is expected to decrease under this alternative because of access limitations and lack of improvements in facilities near the Greater Sand Dunes Recreation Area. Estimated levels of recreation are discussed in detail in Section 4.7, Recreation Resources. The majority of OHV use would occur within the Greater Sand Dunes Recreation Area; however, some activity would also be expected throughout the planning area. Adverse impacts on wildlife habitat would be significantly less than under the No Action alternative because of the combination of a reduction in use and, most important, closure of sensitive wildlife habitats to OHV use. Seasonal limitations on OHV use in big game crucial habitat and limiting use in the remainder of the planning area to designated roads and trails would also contribute to the reduction of adverse impacts on wildlife habitat under this alternative.

Hunting activity is expected to be greater than under the No Action Alternative over the planning period because of decreased development and therefore limited access to the planning area. Adverse effects on wildlife would be short term as described under the No Action Alternative.

Overall adverse impacts of surface disturbance on wildlife habitat would be greatly reduced compared with the No Action Alternative because of designations that controlled, excluded, or seasonally limited surface disturbance in sensitive wildlife habitats (Map 28). Steamboat Mountain crucial overlap, wetlands, riparian areas, and floodplains and the Steamboat Mountain ACEC would be designated areas with controlled surface use under this alternative. Greater sage-grouse nesting concentration areas, greater sage-grouse winter range, elk and mule deer parturition areas, mountain plover aggregation areas (with a one-quarter-mile buffer), the Greater Sand Dunes ACEC, and raptor nesting sites (with a one-half- to 1-mile buffer) would be designated NSO areas under this alternative. Big game crucial habitat (winter range) would be seasonally limited. Adverse effects of ROWs on wildlife habitat under this alternative would be less than under the No Action Alternative because of designation of sensitive wildlife habitats as either ROW avoidance or exclusion areas (Map 27). Designation of these areas would provide adequate protection of wildlife habitat from ROWs so that only minimal adverse impacts from adjacent disturbances or areas that could not be avoided would occur.

Development of a transportation plan specific to the planning area would further reduce adverse impacts on wildlife habitat from ROWs, roads, OHV use, and general access. This plan would provide for appropriate access routes that enabled maximum protection of crucial habitats and sensitive resources.

Adverse effects on wildlife habitat from geophysical activities would be minimal because of provisions that exclude exploration in areas with NSO requirements, WSAs, ACECs, and other sensitive resource areas. Seasonal limitations would also apply, further reducing the impact on wildlife habitat.

Adverse effects on wildlife habitat from communication sites would be slightly less than under the No Action Alternative because sites would not be allowed within ACECs.

The majority of the planning area would be closed to new fluid mineral leasing because of closures of sensitive resource areas, which include all sensitive wildlife habitats (Map 31). Existing leases within the planning area would still be valid; however, purchase or exchange of those leases would be pursued with willing leaseholders. Approximately 163 oil and gas wells would be drilled over the planning period: 16 wells in the first 4 years with drilling steadily decreasing thereafter to 5 wells per year as producing wells played out. Adverse effects on wildlife habitat from fluid mineral development are expected to be much less than those under the No Action Alternative because of a reduction in the number of wells assumed for the planning period, closure of sensitive wildlife areas, and the purchase or exchange of existing leases. Because of uncertainty surrounding the number of leaseholders who would participate in the purchase or exchange of their leases, and the amount of funds available to BLM for this activity, it is unknown whether adverse impacts on wildlife habitat would occur and how great these impacts would be.

The effects of coalbed gas development would be approximately half of those described under the No Action Alternative because approximately half the number of wells would be drilled.

Assuming a total of 163 oil and gas wells and 25 coalbed gas wells, water depletions from oil, gas, and coalbed gas wells would total approximately 270 acre-feet from the Colorado River system and 12 acre-feet from the Platte River system. Based on a 20-year time span, the average annual depletion for the Colorado River and the Platte River systems would be 13.5 acre-feet and 0.6 acre-feet, respectively. Depletion of water from the Colorado and Platte River systems and its effect on threatened and endangered species downstream are described in the Biological Assessment (Appendix 3) for this document.

There would be no adverse effects from locatable mineral development, mineral material sales, coal leasing, or coal and sodium exploration because the entire planning area would be withdrawn from or closed to these activities (Maps 32–35).

Management actions associated with the addition of the paleosol deposition area to the Greater Sand Dunes ACEC and the addition of the area of highest concentration and overlap of big game habitat features, natural systems, and cultural values to the Steamboat Mountain ACEC would benefit wildlife habitat through further restrictions on activities within these sensitive areas. Management actions associated with designating special status plant species habitat, the cushion plant community, and the Pinnacles Geologic Feature as ACECs would also benefit wildlife habitat as described above.

Impacts on federally listed and candidate species would be the same as those described under the No Action Alternative.

This alternative would most likely have the least amount of adverse impacts on wildlife.

4.4.6.5 Alternative 3

Effects of prescribed fire (vegetation treatment) under this alternative would be similar to those under the No Action Alternative, except that treatments in aspen communities (big game parturition habitat) would be fenced on a case-by-case basis to reduce excess foraging by big game and livestock after prescribed burns, further protecting this habitat for future use by wildlife.

The effects of watershed management actions would be the same as those under the No Action Alternative, except that these beneficial impacts would be greatest under this alternative because of increased restrictions on surface disturbing activities and larger buffer zones around riparian areas and floodplains.

Because of the expansion of the Divide Basin Wild Horse HMA to include the entire planning area, adverse effects of wild horses on wildlife habitat are expected to be slightly less than those under the No Action Alternative because of an increase in forage area and water sources. Impacts would be only slightly less because a maximum of 100 horses of the 415–600 AML would be allowed in the expanded area.

Although livestock operators could increase AUM use to the fully permitted amount, anticipated use of AUMs would be similar to historic levels. Effects of livestock grazing on wildlife habitat under this alternative would be the same as that under the No Action Alternative, except that water developments would be allowed in sensitive wildlife habitat only if they maintained or improved habitat and resource conditions.

Effects on the habitat of endangered fish, wildlife, and/or plant species in the Colorado and Platte River systems from water depletions caused by construction of livestock water developments would be the same as those under the No Action Alternative.

Impacts on wildlife habitat from the management of special status plant species would be the same as those under the No Action Alternative. Impacts on Wyoming BLM sensitive species would be the same as those under the No Action Alternative, except that additional area (greater sage-grouse winter range) would be seasonally limited, greater sage-grouse nesting habitat within 2 miles of the lek would be under seasonal limitations, and mountain plover aggregation areas (with a one-quarter-mile buffer) would be avoidance areas for surface disturbance activities.

OHV use is expected to remain constant because the facilities near the Greater Sand Dunes Recreation Area would not be improved and access limitations would remain in place. Estimated levels of recreation activity are discussed in detail in Section 4.7, Recreation Resources. The majority of OHV use would occur within the Greater Sand Dunes Recreation Area; however, activity is also expected throughout the planning area. Adverse impacts on wildlife habitat would be less than under the No Action Alternative because of the combination of a reduction in use and restrictions on wildlife habitat such as closure of raptor nesting sites (with one-half- to 1-mile buffers) and greater sage-grouse leks (with one-half-mile buffers). Seasonal limitations would remain the same as under the No Action Alternative, except that raptor nesting sites would be closed and mountain plover aggregation areas (with one-quarter-mile buffers) would be added.

Hunting activity in the planning area would be the same as under the No Action Alternative.

Recreation activities other than OHV use (camping, hiking/biking, recreational mining) would be expected to increase steadily throughout the planning period; however, camping would be allowed only in designated areas, and recreational mining would occur only on a 5-acre site, reducing the impacts from these activities compared with the No Action Alternative.

Adverse effects of surface disturbance on wildlife habitat would be reduced compared with the No Action Alternative because of designations that controlled, excluded, or seasonally limited surface disturbance on sensitive wildlife habitats (Map 39). Wetlands, riparian areas, and floodplains, as well as all ACECs, are designated areas with controlled surface use under this alternative. Greater sage-grouse leks (with one-half-mile buffers) and raptor nesting sites are designated NSO areas under this alternative. Permanent or high-profile structures would also be limited within a specified distance of these areas. Big game crucial habitat (winter range) and parturition areas, mountain plover aggregation areas (with one-quarter-mile buffers), greater sage-grouse nesting habitat within 2 miles of leks, greater sage-grouse winter range, and raptor nest sites (with one-half- to 1-mile buffers) would be seasonally limited. These restrictions would reduce adverse impacts on these species during important times of their life cycle; however, they would not prevent further habitat destruction from occurring, which might result in the selection of alternative habitats. The option to time and sequence activities if adverse effects occurred would allow possible adjustment of habitat use. It is assumed that even with the additional protections for greater sage-grouse under this alternative, populations would continue to decline because the management of these birds' habitat would be insufficient for recovery or stabilization of populations in the planning area. Because the greater sage-grouse is a BLM sensitive species, any loss of habitat function or value would constitute a significant impact. Also, these birds are classified by the WGFD as "vital," and any increased mortality or decreased survival would be considered a significant impact. This alternative might result in significant impacts on the birds, depending on the location and sequencing of disturbances.

Adverse effects of ROWs on wildlife habitat under this alternative would be slightly less than under the No Action Alternative because of changes in sensitive wildlife habitat designation as either ROW avoidance or exclusion areas (Map 40).

Development of a transportation plan specific to the planning area would further reduce adverse impacts on wildlife habitat from ROWs, roads, OHV use, and general access. This plan would provide for appropriate access routes that enabled maximum protection of crucial habitats and sensitive resources.

Adverse effects on wildlife habitat from geophysical activities would be minimal because of provisions that exclude exploration from areas with NSO requirements, WSAs, ACECs, and other sensitive resource areas. Seasonal limitations would also apply, further reducing the adverse impact on wildlife habitat.

Adverse effects on wildlife habitat from communication sites would be slightly less than under the No Action Alternative because of the additional exclusion areas (Oregon Buttes and Continental Peak) added under this alternative.

The entire planning area, except WSAs, would be open to fluid mineral leasing (Map 42). Approximately 205 oil and gas wells would be drilled over the planning period: 18 wells per year in the first 4 years with drilling then steadily decreasing to 7 wells per year as producing wells played out. Adverse effects such as those described under the No Action Alternative would occur; however, an adaptive management process would be implemented under this alternative that would establish indicators to inform BLM of any adverse effects of actions within the planning area and prevent the effects from becoming significant through BLM's ability to control timing of development activities if needed. Adverse effects of existing leases (as described above in the Common to All Alternatives section) would still occur; however, once leases expired they would become part of the adaptive management process.

The effects of coalbed gas development would be the same as those described under the No Action Alternative.

Assuming a total of 205 oil and gas wells, with the remaining assumptions being the same as those under the No Action Alternative, water depletions from oil, gas, and coalbed gas wells would total approximately 367.5 acre-feet for the Colorado River system and 15 acre-feet for the Platte River system. Based on a 20-year time span, the average annual depletion for the Colorado River and Platte River systems would be 18.4 acre-feet and 0.75 acre-feet, respectively. The depletion of water from the Colorado and Platte River systems and its effect on threatened and endangered species downstream are described in the Biological Assessment (Appendix 3) for this document.

There would be some limited adverse effects on the northern parturition areas from existing mining claim activities; however, effects would be reduced because of the withdrawal of this habitat under this alternative (Map 45). Withdrawal of portions of Steamboat Mountain and of the area added to the Greater Sand Dunes ACEC would also reduce adverse effects of mining on wildlife habitat. The effects of locatable mineral development on wildlife habitat would otherwise be the same as under the No Action Alternative.

The planning area would be open for consideration of mineral material sales except in certain sensitive wildlife habitat (Map 46). Closing these areas to mineral material sales would benefit a portion of wildlife habitat; however, having Steamboat Mountain ACEC open to sales would cause greater adverse effects on big game. Overall impacts of mineral material sales on wildlife habitat could be slightly greater than those under the No Action Alternative.

The effects of coal and sodium exploration on wildlife habitat would be less than those under the No Action Alternative because of the additional closure of Steamboat Mountain ACEC.

The effects of coal leasing on wildlife habitat would be less than under the No Action Alternative because additional areas would be protected.

Management actions associated with the expansion of the Greater Sand Dunes and the Steamboat Mountain ACECs would benefit wildlife habitat through further restrictions on activities within these sensitive areas. The Greater Sand Dunes ACEC would be expanded to include the paleosol deposition area, and Steamboat Mountain ACEC would be expanded to include Indian Gap and the face of Steamboat Mountain. Management actions associated with designating special status plant species and the cushion plant community as ACECs would also benefit wildlife habitat as described above.

Impacts on federally listed and candidate species would be the same as those described under the No Action Alternative.

4.4.6.6 Proposed JMH CAP

Two types of adverse impacts on wildlife are common to all alternatives: displacement and habitat fragmentation. However, these two types of adverse impacts would vary in degree depending on alternative. Displacement resulting from surface disturbing or disruptive activities moves animals into less desirable habitat and creates competition for available resources with other species and uses. Wildlife displacement can be either direct or indirect, depending on the amount and type of activity.

The amount of land used for road surfaces, well pads, stock tanks, and any recreation facilities represents a direct loss of wildlife habitat. The actual effect caused by surface disturbing and disruptive activities in desert areas void of tall stands of vegetation or dramatic topographic relief is greater than the direct loss of acreage indicates. Wildlife habitat loss results from road construction and road use, facility construction and placement, pipeline construction, field facility maintenance, ROW construction, range improvement construction, and disturbance zones around these areas. Not all disturbed acreages would be fully reclaimed to the same structure and density that existed in predisturbance conditions, and portions, particularly in shrub communities and stabilized sand dunes, could remain unavailable as habitat for wildlife for more than 20 years. The basin big sagebrush/lemon scurfpea community habitat would likely take up to 70 years to reach their predisturbance structure and density. Limited rainfall, poor soils, and severe winter conditions make reclamation difficult, increasing the time required to reestablish suitable vegetation to predisturbance composition and density.

Activities in desert-type terrain tend to displace wildlife, particularly big game species by distances of more than 3 miles because of extended sight distances and lack of security cover. The loss of adjacent habitats due to harassment or habitat degradation is much more subtle but has been observed and documented.

Elk have been shown to avoid disturbance by upwards of 1.25 miles from active oil and gas wells (Gussey 1986; Powell 2003; WGFD 2000), upwards of 2.4 miles from construction of drill sites (Hayden-Wing Associates 1990), and upwards of 1.25 miles from major roads (Powell 2003). Disturbance is also avoided or reduced by topographic visual barriers between the source of disturbance and the elk (Irwin and Gillin 1984; Ward 1986; Olson 1981; Kuck et al. 1985; Van Dyke and Klein 1996). This disturbance is usually temporary, however, and some studies have shown that elk return to the area of disturbance once the source of disturbance and human presence are gone (Gussey 1986; WGFD 2000), albeit at 50 percent of previous levels in forested environments (Hayden-Wing Associates 1990). Studies particular to oil and gas activities have shown that elk tolerate some level of operating wells and associated facilities

as long as there is no human presence or cover is available in the vicinity of the well site (Gusey 1986; Beak Consultants 1979; Bennington et al. 1982; Hayden-Wing Associates 1990).

Van Dyke and Klein (1996) found that elk showed no shift in home range between the pre and post drilling of a single oil well with all roads closed to other traffic and remote monitoring during sensitive periods. However, they shifted use of core areas out of view of the drill pad during both periods, there was increased intensity of use in core areas after drilling, and a slightly reduced total range was used. Van Dyke and Klein concluded that if drilling occupied a relatively small amount of home range, elk were able to compensate by shifting areas of use.

Kuck et al. (1985) showed that persistent disturbance weakened the tendency of elk (in forested environments) to return to the disturbed area and that selection of more marginal habitat occurred. However, abandonment of the traditional calf-rearing habitat did not result in abandonment of calves or a difference in survival rates between disturbed and control groups. This study also found no data to suggest that elk habituated to mining noises. Johnson and Wollrab (1987) also found that elk distribution changed during gas exploration and field development, with the abandonment of winter and calving habitat and changes in range. These authors discovered that although elk returned to disturbed sites, populations were lower (sometimes less than half) and use of the habitat was unpredictable.

When studying elk response to roads, Lyon and Ward (1982) found that elk moved from 0.24 to 1.8 miles, depending on the amount and type of traffic, road quality, and adjacent cover density. Generally, road avoidance has been reported to be greater in areas of open vegetation with less adjacent cover (Perry and Overly 1976; Lyon 1979) and in areas with increased density of high-quality roads (Hershey and Leege 1976). Road avoidance also was greater in shrub lands than in pine forests and juniper woodlands (Rost and Bailey 1979).

A JMH Desert Elk Study was initiated in 1999 to better understand the effects of human disturbance on elk behavior and habitat use within the planning area. The findings of this study are outlined in Section 3.1.6.1.3 and include the following: Elk typically avoided habitats offering little security cover; topography and screening cover by vegetation were important during daylight hours for providing security cover; habitat use patterns within the planning area were strongly influenced by roads, making the habitat loss much more than that of the actual road “footprint”; human disturbance led to increased daily movements of disturbed elk and reduced elk use of traditional calving areas; and although disturbed elk moved greater distances, they apparently did not move to areas that were poorer in terms of security or habitat quality (Powell 2003).

In contrast to the numerous studies conducted on the effects of human disturbance on elk (as shown above), significantly fewer studies have been conducted on the effects of such disturbance, particularly from roads and/or oil and gas development, on mule deer and pronghorn antelope. For this reason, possible effects on these species are not well understood. Rost and Bailey (1979) found that mule deer avoided roads by up to 200 meters (0.12 miles) and that road avoidance was greater where roads were more traveled and in shrub versus forested habitats. There are no published studies on pronghorn antelope reactions to roads; however, it has been documented that woven wire ROW fences along roads impede or block antelope movement, resulting in fragmentation of habitat (Deblinger 1988; Bruns 1977) and pronghorn deaths due to reduction or elimination of access to severe winter relief range.

Hiatt and Baker (1981) examined the effects of a single well installation on winter distributions of elk and mule deer. They found that both species avoided the drilling site during drilling but did not avoid the access road. They also examined the vegetation present at the well location and concluded that shifts in usage were not the result of differences in vegetation. Easterly et al. (1991) examined the winter distribution and habitat use of pronghorn and mule deer within a petroleum production complex and

found that pronghorn used four of six oil fields in proportion to their availability and that mule deer used five of six oil fields in proportion to their availability. Two of the most active oil fields were used less than expected by pronghorn given their availability, and no mule deer were observed within one of the most active oil fields. Easterly et al. concluded that there was continued use of winter range by pronghorn and mule deer after construction of an oil and gas field.

It is generally agreed that once disturbance reaches a certain threshold, impacts are expected to become significant. Further study and monitoring are needed to determine this threshold for the planning area.

Habitat fragmentation occurs when a contiguous habitat is broken up (fragmented) by surface disturbing activities, causing a reduction in usable ranges and the isolation of smaller, less mobile species; a loss of genetic integrity within species or populations; and an increase in abundance of the habitat generalists that are characteristic of disturbed environments (i.e., competitors, predators, and parasites) (Harris 1998). The primary factor affecting wildlife species (especially big game) within the planning area is the reduction in usable habitat and the disruption of migration corridors that link crucial habitat (winter range) and parturition areas. This would occur particularly in areas with many access roads and surface disturbances. Transportation routes tend to fragment habitats and can act as barriers to some species, especially under severe winter conditions. This could also increase public access to areas that had previously been relatively inaccessible to vehicles during the winter and spring. This effect would become more important and would increase adverse effects on wildlife as increased demands for use of public lands occurred. Migration routes could be altered, changing some traditional use patterns on a local level. Seclusion areas for wildlife would become smaller and more dispersed in some areas. Increased oil and gas activity, especially in areas with reduced well spacing (40- and 80-acre spacing) would preclude use of some of these areas by wildlife species, especially deer and elk. Existing leases within the planning area might not provide the specific mitigation measures needed to protect important wildlife habitats. In specific cases where stipulations were not adequate to protect habitat, COAs for APDs could be applied. These would be based on site-specific analysis and would establish specific, necessary mitigation measures not covered by stipulations for resource and environmental protection. BLM specialists would review sensitive resources with lease operators to develop and implement protective measures to allow effective development operations where impacts could be avoided or mitigated. Depending on the economics of the industry at the time, it is possible that developers could claim an economic hardship and might not have to implement recommended mitigation measures. Greater sage-grouse populations have been declining over the past half century due to such factors as habitat degradation, fragmentation, and loss (see Chapter 3). As oil and gas development has increased in Wyoming, so has concern over how this type of development might affect greater sage-grouse populations. Potential impacts of fluid mineral development on greater sage-grouse populations include: direct habitat loss from well, road, pipeline, and transmission line construction; displacement caused by increased human activity and associated pumping noise; increased legal and illegal harvest; and direct mortality associated with evaporation ponds and increased exposure to predation (Braun 1986; TRC Mariah Associates Inc. 1997).

A study of the greater sage-grouse of the Pinedale Mesa near Pinedale, Wyoming, was conducted by Lyon in May 2002 to examine the effects of natural gas and oil development on use, productivity, general movements, and habitat use of greater sage-grouse. The results of the study indicate that hens captured on disturbed leks had lower nest initiation rates; traveled twice as far to nest sites; and selected, for height, greater total shrub canopy cover and live sagebrush canopy cover than did hens captured from undisturbed leks. Lyons concluded that extreme early brood survival appeared to be the limiting factor in greater sage-grouse population stability on the Pinedale Mesa and that this suggested that disturbances (i.e., noise and predation) associated with well drilling and road traffic during breeding could result in reduced nest initiation rates and could be causing lower brood survival.

Other studies conducted on greater sage-grouse indicate that noise might be adversely affecting strutting and nesting grouse; however, the level of impact is still unknown (LaGory et al. 2001; Dantzker et al. 1999).

As documented in Chapter 3, greater sage-grouse nesting and wintering habitat requirements are quite specific. If this habitat were disturbed, more than 20 years might be required to restore affected habitat to predisturbance conditions. During this time, however, opportunities may exist to enhance remaining vegetation and habitat characteristics (for example, by applying vegetation treatments to create a mosaic in the landscape) to provide more suitable habitat than currently exists. If that cannot be accomplished, there would be a net loss of habitat function and adverse impacts on greater sage-grouse habitat during the planning period.

The health of fisheries within the planning area is directly related to the overall health and functional capabilities of riparian resources, which in turn are a reflection of watershed health. Any activities that affected the ecological condition of the watershed and its vegetative cover would directly affect the aquatic environment. It is assumed that any substantial disturbance to soils or changes in vegetative cover would have an adverse effect on watershed health and water quality and would therefore have an adverse effect on associated fisheries. The degree of impact attributed to any one disturbance or series of disturbances is influenced by location within the watershed, time and degree of disturbance, existing vegetation, and precipitation. Surface disturbances result in accelerated erosion and runoff, increasing stream flow and sediment and nutrient loads to local channels. Sedimentation of a given channel can impact fisheries by reducing habitat complexity, which results in a lower diversity of prey organisms. Increased turbidity also results from increased sediment input, which decreases light penetration and inhibits visual predation by fish. Any surface disturbance near streams that results in substantial removal of riparian vegetation can increase current velocity, which puts additional strain on fish and reduces nutrient cycling. In addition to increased sediment input, streambank disturbance can affect fisheries by creating bank instability, which can alter flow and destroy pool-riffle formations necessary for fish survival. Increased nutrient loading of streams can impact fisheries by increasing primary production above natural levels, which degrades habitat and decreases oxygen levels. Because any impact on natural water resources is also an impact on fisheries, impacts on fisheries can be inferred from Section 4.4.2, which discusses impacts on riparian areas and water quality.

Oil and natural gas production may result in the use of pits to separate oil from produced water or to evaporate large volumes of water with high levels of TDS. Birds are attracted to pits because they mistake them for natural bodies of water. The sticky oil then entraps birds in the pits, and they die from exposure and exhaustion. Birds that do manage to escape can die from starvation or experience impaired reproduction caused by the toxic effects of oil ingested during preening. Scavengers and predators can also suffer adverse effects from consuming oiled birds. Pits or ponds containing hypersaline water can pose a mortality threat to migratory birds through ingestion of toxic brine, susceptibility to avian botulism, and sodium crystallization on feathers, which destroys thermoregulatory and buoyancy functions. A study of bird mortality in oil pits in Wyoming conducted by Brent J. Esmoil for the University of Wyoming demonstrated that deterrents such as flagging, strobe lights, metal reflectors, and noisemakers were not effective in preventing bird mortalities in these pits. Esmoil did not find any mortality in pits completely covered with netting or wire mesh with mesh sufficiently small to prevent songbirds from falling through the wire (USFWS 2003). It is BLM standard practice that pits with harmful fluids in them be maintained in a manner that prevents migratory bird mortality, thus eliminating potential effects.

Use of prescribed fire as a vegetation treatment in the planning area could benefit many wildlife habitats because it aids in regeneration of some tree and shrub species and allows additional wildlife forage. One adverse effect of prescribed fire on wildlife habitat is extensive forage utilization by big game species

after treatment of aspen stands. To reduce adverse effects on aspen communities, treatments would be fenced on a case-by-case basis. Another possible adverse impact of prescribed fire in the planning area would be loss of cover. Conversions of shrubs to grassland using prescribed fire would contribute to a direct loss of cover for species (such as small mammals, greater sage-grouse, and big game) that require cover for security to carry out life stages. The effects of loss of cover could be long-term, particularly because it takes sagebrush more than 20 years to reach the appropriate canopy cover height and spacing needed for some sagebrush-dependent species. Greater sage-grouse are particularly susceptible to loss of cover from fire activities because of the relationship between their breeding, brood-rearing, and wintering habitat and sagebrush. Significant long-term adverse impacts on greater sage-grouse nesting habitat and winter range could occur if large acreages were burned. Brood-rearing habitat might also be negatively affected by prescribed burns; however, further investigation is needed. No prescribed fires would be allowed within the basin big sagebrush/lemon scurfpea vegetation association; therefore, effects on wildlife dependent on this association would not occur.

Watershed management would provide benefits to wildlife by maintaining or restoring habitat conditions through the establishment of DPC objectives, placement of buffer zones around riparian areas, and restrictions on surface disturbance within riparian areas and floodplains. Actions that would maintain or improve watershed conditions would generally benefit the ecological condition of wildlife habitat.

Wild horses currently occur in the planning area outside the identified HMAs. This compounds problems associated with limited water sources and big game crucial habitat (winter range). Wild horses concentrate in the core area during the summer months and compete with big game for available forage during winter months (November through March). With livestock competition for available water and forage added to wild horse competition, adverse impacts on big game would be expected. Water developments provided on an as-needed basis would reduce this competition and therefore lessen adverse impacts on big game. All water developments within sensitive wildlife habitats would be considered only if wildlife habitat and resource conditions were improved or maintained. Adverse impacts in the planning area from wild horses would also be minimal provided that numbers were kept at plan objective levels and the herd was maintained within the HMA.

The effects of livestock grazing on wildlife would be minimal because management actions (livestock water developments, exclosures, fencing, and conversions) for improving rangeland and riparian habitat must meet the Wyoming Standards for Healthy Rangelands (Appendix 10). Forage utilization levels would be evaluated on a case-by-case basis and would factor in forage for livestock, wildlife, and wild horses. Water developments proposed in sensitive wildlife habitat would be considered only if the habitat and resource conditions would be maintained or improved and could benefit wildlife by providing additional sources of water. Water developments could also adversely affect wildlife habitat, particularly in winter and parturition ranges, through reductions in forage due to increased distribution of animals. However, implementation of the Wyoming Standards for Healthy Rangelands would ensure that impacts were not significant. Adverse impacts of fences on wildlife within the planning would be minimal because of requirements that fences be located so as not to impede wildlife movement and that the fences be removed, modified, or reconstructed where documented conflicts with wildlife occurred. Future livestock conversions (sheep to cattle or vice versa) would be carefully analyzed. Sustainability reviews would be required before conversions, which would benefit the range.

It is estimated that 23 livestock pits, ponds, and water wells could be created or rebuilt in the planning area. It is assumed that all water used for livestock pits, ponds, and water wells within the Green River and Sweetwater River Basins would have contributed to the surface flows of the Colorado or Platte Rivers or their tributaries. Water depletions are an important issue because water from portions of the planning area is part of the habitat for endangered fish, wildlife, and/or plant species downstream from the project area in the Colorado and Platte River systems. Of the 23 water developments to be constructed, 19 would

be in the Green River Basin (Colorado River), and 4 would be in the Sweetwater River Basin (Platte River). Using 5 acre-feet per water development over the 20-year planning period, average annual depletions anticipated from these actions would not exceed 5 acre-feet for the Colorado River system and 1 acre-foot for the Platte River system after all developments were installed.

The potential exists for additional strain on forage resources within portions of the planning area (south-central) from potential concentrations of grazing animals. Heavy concentrations of grazing animals could result in overutilization of vegetation. However, monitoring and evaluation of habitat to comply with the "Wyoming Standards for Healthy Rangelands" should provide information on vegetation resources before impacts became significant.

Protections afforded to special status plant species would benefit wildlife habitat by protecting plant species from surface disturbing and disruptive activities. Reduction of invasive species would also benefit wildlife habitat through maintaining the quality of habitat by requiring provisions to reduce and control invasive species.

The management of heritage sites would indirectly benefit wildlife through preservation of potential habitat as well as general habitat characteristics. Disturbance and removal of vegetation could occur through activities related to management of heritage resources; however, any impact would generally be limited to relatively small areas. Even under the most intense management (i.e., excavation), the amount of habitat disturbed would be very small. However, such disturbance could still have significant impacts on small animals (e.g., pygmy rabbits, a BLM sensitive species and WGFD classification as "high" value) occupying those areas.

OHV use is expected to increase because of improvements in the facilities near the Greater Sand Dunes Recreation Area, increased interest in the planning area, and increased access due to development activities. Estimated levels of recreation activity are discussed in detail in Section 4.7, Recreation Resources. The majority of OHV use would occur within the Greater Sand Dunes Recreation Area; however, activity is also expected throughout the planning area. No significant impacts on wildlife (specifically elk, mule deer, antelope, greater sage-grouse, and raptors) are expected from OHV use because of the ability to place seasonal restrictions on OHV users (Map 52) at crucial times in sensitive habitats; seasonal closure of Steamboat Mountain; limitation of access to designated roads and trails in the Steamboat Mountain ACEC; and the fact that the majority of OHV use in the planning area (outside the seasonal closure area) would occur in the summer and fall (June through October), a time when wildlife would be the least sensitive to human disturbance. However, OHV use would have localized adverse impacts on wildlife through disturbance due to human presence, and a small amount of surface disturbance. Additional areas of seasonal restrictions could be implemented as needed to reduce adverse impacts. ROWs (such as pipelines and power lines) could adversely affect wildlife habitat through disturbances related to associated roads, increased access, and associated displacement caused by human presence. Many of these alternations of habitat favor predators, thereby increasing predation of species such as the greater sage-grouse. Although companies might not need to travel pipeline routes, removal or crushing of vegetation would allow increased access for recreationists, causing further intrusion into wildlife habitat and increased disturbance. Currently, numerous two-track-type roads access almost all parts of the planning area, although these are used primarily seasonally during hunting. Aboveground pipelines would have less adverse impact on crucial wildlife habitats (big sagebrush, mountain shrubs, woodland habitats, stabilized sand dunes); however, these pose a threat to public safety, primarily to OHV users.

ROW impacts on sensitive wildlife habitat contained in the South Pass Historic Landscape ACEC, West Sand Dunes Archaeological District, greater sage-grouse nesting habitat, and connectivity area would be reduced because of these areas' designation as avoidance areas (Map 49). To the extent possible, utility

and transportation ROWs would be located to coincide with existing roads, trails, and other ROWs or easements, further reducing adverse impacts on wildlife.

Communication sites and related access, when located in crucial habitat (winter range) and parturition areas, would have significant impacts on those habitats. Access to these sites occurs year-round. Year-round access could result in plowing of roads that displaces wintering wildlife, which would add to their stress caused by winter conditions, and disrupt parturition areas. Plowing of these roads would also allow more recreational traffic to use these areas year-round. The Steamboat Mountain ACEC and the Steamboat Mountain Management Area would be closed to communication sites, which would greatly reduce possible adverse impacts on the majority of big game habitat.

Effects of geophysical exploration and related detonation activities on wildlife would be minimal given limitations on exploration within key wildlife habitats such as the connectivity area, basin big sagebrush/lemon scurfpea, and a one-quarter-mile buffer around greater sage-grouse leks. Exploration and related detonation activities also would be allowed in sensitive resource areas only if they could be performed with acceptable mitigation of impacts.

Overall, the development of a transportation plan specific to the planning area would further reduce adverse impacts on wildlife habitat from ROWs, roads, OHV use, and general access. This plan would provide for appropriate access routes, which enable maximum protection of crucial habitats and sensitive resources. Further reductions in adverse effects of transportation and access to big game would occur through development of a travel management plan for Steamboat Mountain, White Mountain, Essex Mountain, and the two northern parturition areas, to control development access.

Recreation activities (camping, hiking/biking, recreational mining) in the planning area would be expected to increase steadily throughout the planning period. Recreation activities would have localized adverse impacts on wildlife through disturbance due to human presence, and a small amount of surface disturbance. It is unknown whether these impacts would be short term or long term. Developed recreation sites would not be constructed in greater sage-grouse nesting habitat.

Hunting activity in the planning area has been shown to have short-term adverse effects on elk, and most likely all wildlife, in the planning area because of an increase in human activities and disturbance (Powell 2003). Hunting is expected to remain constant; therefore, the level of short-term disturbance from increased human activity would remain the same.

Greater sage-grouse lek, nesting, and early brood-rearing habitat locations (as determined by site-specific analysis) would be avoidance areas for surface disturbing and disruptive activities and would be protected from direct habitat loss and degradation. Habitat quality at these locations would also be improved on an as-needed basis. These management prescriptions provide the greatest amount of protection to the species under the JMH CAP alternatives; however, a large portion of greater sage-grouse habitat is located within areas that contain existing leases. As discussed previously, existing leases might not provide the specific mitigation measures needed to protect important wildlife habitats. In these cases, COAs might be necessary, as determined by site-specific analysis. A portion of greater sage-grouse habitat is also located within Area 3 of the JMH CAP fluid mineral leasing implementation strategy (Appendix 17), which would retain a “no lease” management prescription or an NSO stipulation that would ensure protection of unleased habitat in Area 3 as well as habitat within leased areas for which the leases expired before they were developed or held by production. The majority of identified greater sage-grouse breeding and winter range occurs in Area 1, identified for immediate sale of new leases. In addition to areas designated with surface disturbance restrictions, seasonal limitations would apply to all greater sage-grouse winter range, as well as to raptor, mountain plover, and big game sensitive habitats. These restrictions would reduce adverse impacts on these species during important times of their life

cycle; however, they would not prevent further habitat destruction from occurring, which could result in the selection of habitats of lower quality.

Approximately 205 fluid mineral wells (exploration, discovery, production) would be drilled over the planning period. Drilling could occur throughout the planning area, except in unleased portions of Area 3 of the JMH CAP fluid mineral leasing implementation strategy (Appendix 17), on leases with an NSO stipulation, and in WSAs. It is likely that drilling would occur mostly on existing leases for the first few years of development. The phase of fluid mineral activity most disturbing to wildlife is drilling because of the high level of human disturbance from the creation of access roads, surface disturbance from the well pads (approximately 3 acres), noise from the rig during drilling, and overall human presence. This phase of activity lasts approximately 1 to 4 months depending on well depth. All wells not put into production would be reclaimed through implementation of a reclamation plan. Production wells that played out after an estimated 30 years would also be reclaimed. Full restoration of some habitats (shrubland and basin big sagebrush/lemon scurfpea) would not occur for more than 20 years.

Big game, especially elk and mule deer, would experience adverse effects from fluid mineral development, causing avoidance of areas through drilling, creation of roads, and possible disruption of migratory corridors. The level and duration of adverse effects would depend on where the activity occurred within the planning area. It is assumed that the majority of development would be concentrated in the high development potential area, a large portion of which is contained within Area 3 of the JMH CAP fluid mineral leasing implementation strategy (Appendix 17). The majority of big game sensitive habitats are also located within Area 3. A portion of Area 3 would retain a “no lease” management prescription or would be leased with an NSO stipulation that would ensure protection of big game sensitive habitat in these areas. A large portion of sensitive big game habitats within Area 3, however, are in areas that have already been leased. The majority of existing leases have a minimum stipulation that protects big game habitat seasonally, but as shown in the analysis of the other alternatives, seasonal restrictions do not prevent destruction of habitat, resulting in the selection of suboptimal habitats. In specific cases where stipulations would not be adequate to protect big game habitat, COAs for APDs could be applied, as discussed previously. Without specific mitigation, such as remote monitoring, pad drilling, directional drilling, and centralized tank batteries, development activities could prevent big game from using the affected area for the life of the activity. This has the potential to cause significant effects on big game through long-term displacement from habitat, with the severity of the effects depending on the amount, timing, and duration of activity.

As part of the “no lease” prescription in Area 3, existing leases that expired before they were developed or were held by production would not be reoffered for lease, further protecting big game habitat resources. Because of this, however, development on existing leases within Area 3 is expected to occur in the first 11 years of the planning period, instead of over the life of the plan (20 years). A shortened development period in Area 3 would likely result in the following: existing leases’ being developed concurrently, or within close time periods that would not allow habitat in those areas to recover before other areas were developed; displacement of big game into habitats that were not leased, causing possible overuse of available habitat and increased competition among and between species for available habitat; and long-term disruption of migration from the northern parturition areas to the core area because of the location of existing leases south of Oregon Buttes ACEC. These effects could be significant for big game habitats, depending on the amount, timing, and duration of development activities, and could be greater than those under the No Action Alternative because of the potential for lack of alternate habitats for big game species due to concentrated timing of development in Area 3.

It is estimated that two coalbed gas exploration projects with a total of 50 wells would be drilled within the planning area (but outside the core area) during the planning period. Impacts on wildlife, particularly big game, are expected to be significant for animals in those localized areas. Because coalbed gas wells

are drilled in a "pod" formation for dewatering purposes, with approximately 25 wells per pod, impacts are expected to be intense and localized but might not affect as much acreage as traditional oil and gas well development.

Drilling and completion activities for oil, gas, and coalbed gas wells would use local water sources and would therefore deplete water from portions of the planning area that are part of the habitat for endangered fish, wildlife, and/or plant species downstream from the project area in the Colorado River and Platte River systems. It is assumed that all water used for drilling and completion of wells within the Green River and Sweetwater River Basins would have contributed to the surface flows of the Colorado or Platte Rivers or their tributaries. Of the 205 oil and gas wells to be drilled, 95 percent would be in the Green River Basin (Colorado River), and 5 percent would be in the Sweetwater River Basin (Platte River). All of the coalbed gas wells (50) would be in the Green River Basin.

Using 1.5 acre-feet of water per well, depletions from these actions would total approximately 367.5 acre-feet in the Colorado River system and 15 acre-feet in the Platte River system. Based on a 20-year time span, the average annual depletion for the Colorado River and Platte River systems would be 18.4 acre-feet and 0.75 acre-feet, respectively. Depletion of water from the Colorado and Platte River systems and its effect on threatened and endangered species downstream are described in the Biological Assessment (Appendix 3) for this document.

Locatable mineral activity on existing active claims in and around northern parturition areas has the potential to decrease and eliminate the availability of these areas for calving and fawning. This particularly applies to activities that might occur in or near aspen stands associated with deer and elk parturition areas, although some of the aspen stands would be withdrawn as part of the South Pass Summit. Withdrawals would also be pursued for the northern parturition areas, further reducing effects. These areas are also important to a variety of birds and other wildlife and are rare habitat types in the planning area. Although current exploration activities are seasonal, with little or no activity during the winter, mining activities could continue at the current rate, or even increase, during the fawning and calving periods, causing displacement of animals. There is limited information available on the likelihood of other locatable mineral development (such as commercial diamond or gold mining) in the planning area. If exploration activities found the potential for such development, a plan of operation would have to be filed that specified how mining would be conducted without permanently impacting other resources. Reclamation plans would also have to be developed, and bonds posted, to ensure that mined lands were reclaimed.

Habitat within the planning area would be open for consideration of mineral material sales except for habitat within one-half mile to 1 mile of raptor nesting sites, the Steamboat Mountain ACEC, the Steamboat Mountain Management Area, and greater sage-grouse nesting habitat (Map 58). Closing these areas to mineral material sales would benefit the majority of wildlife habitat within the planning area, resulting in minimal localized effects on wildlife through possible disturbance of open habitats.

Coal and sodium exploration would be allowed on a case-by-case basis (with mitigation for protection of sensitive resources), except in wetlands, riparian areas, and floodplains; within one-quarter mile of sage grouse leks; in raptor nesting sites; and in the Steamboat Mountain ACEC (Map 55). Effects of this exploration on wildlife habitat are expected to be minimal because of the limited surface disturbance associated with exploration and the mitigation included in proposals, which could include seasonal limitations, access restrictions to existing roads and trails, and full reclamation.

Only federal coal lands within the Coal and Sodium Occurrence and Development Potential Area would be open to consideration of leasing (Map 57). This would reduce adverse effects on wildlife habitat from coal leasing overall. In addition, a portion of the Greater Sand Dunes ACEC would be closed to leasing

within this area. Raptor nesting sites (with a one-half- to 1-mile buffer), Steamboat Mountain ACEC (big game parturition and crucial habitat), and Steamboat Mountain Management Area would also be open to coal leasing with subsurface mining and controls on surface facilities, further minimizing adverse impacts on wildlife. Additional measures would be implemented for maintenance of adequate big game habitat. Overall, coal leasing is expected to have negligible impacts on wildlife because the projected demand for developing this resource in this area is minimal.

The federally listed black-footed ferret, which may occur within the planning area, might be affected by management actions but would not likely be adversely affected. The black-footed ferret could be affected because of the amount of surface disturbance and human activity associated with management of the planning area; however, no adverse effects are expected to occur because of the surveys required for threatened and endangered species before surface disturbance activities and the subsequent protection measures developed by BLM in conjunction with FWS should a species be found. No impacts on the bald eagle, grizzly bear, gray wolf, or western population of the yellow-billed cuckoo are expected from management of the planning area, because of a lack of suitable habitat or because of these species' status as casual migrants or experimental populations.

Potential effects on the Wyoming BLM sensitive species mountain plover and greater sage-grouse are discussed above. It is unknown whether adverse impacts on other Wyoming BLM sensitive species would occur, because of the lack of information on habitat locations and the requirements within the planning area. Searches for the species would be required in any potential habitat before approval of any project or activity in those areas. If such species were found, mitigation measures would be species-specific and determined on a case-by-case basis.

Protections afforded to special management areas and other management areas would generally result in beneficial impacts on wildlife resources. Protections aimed at conserving vegetation resources, and limitations on surface disturbing activities, would benefit wildlife by enhancing overall habitat conditions. The addition of the West Sand Dunes Archaeological District as a special management area would reduce adverse effects on big game habitats through management prescriptions that controlled surface disturbing and disruptive activities. The expansion of the Steamboat Mountain ACEC and addition of the Steamboat Mountain Management Area would also reduce effects on big game habitats because they would control surface disturbing and disruptive activities in the most concentrated area of crucial winter range and parturition area overlap and the basin big sagebrush/lemon scurfpea plant community, which is important for big game parturition. Disturbances (e.g., excavation) could have locally significant impacts on small animals (e.g., pygmy rabbits,) occupying those areas.

4.5 HERITAGE RESOURCES

Heritage resources are relatively scarce, nonrenewable resources whose values can be easily diminished by physical disturbances. Resources include cultural and historic trails and sites, archaeological sites, Native American respected places, unique geological features, and paleontological sites.

4.5.1 Potential Impacts on Heritage Resources

Management of heritage resources could have environmental impacts on resources and nonenvironmental effects on resource users. Impacts on resources and resource users that might result from implementation of the heritage resource program are discussed in those particular resource sections. This section describes potential impacts on heritage resources resulting from the implementation of management actions for other resource management categories.

The criteria used to determine the significance of impacts on heritage resources include effects on NRHP eligibility, future research potential, and (in some cases) effects on the resources' suitability for religious or traditional uses. An impact would be significant if it resulted in the physical alteration, destruction, or loss of a resource listed or determined eligible for listing on the NRHP, or considered important to Native American groups. To be considered significant, resources must meet one or more of the criteria for inclusion on the NRHP. The impact of an action would be beneficial if it protected or improved public appreciation of heritage resources.

For analysis purposes, it is assumed that the overall density of archaeological sites in the planning area would be approximately 3.2 sites per 640 acres (one section), and that about one-third of the sites would prove to be significant in terms of NRHP criteria. This density is based on less than 5 percent of the planning area's having been inventoried at a Class III level intensity. This sample is recognized to be very low and potentially misleading. The BLM also recognizes that areas with site densities as high as 15 sites per section have been found elsewhere in the Green River Basin.

4.5.1.1 Common to All Alternatives

Direct impacts on heritage resources would be from surface disturbing activities and soil compaction, whereas indirect impacts could occur as a function of increased erosion, easier access, vibration from vehicles and equipment, or alteration of the setting associated with certain heritages resources. Indirect impacts could also occur if heritage resources lost potential information, integrity, and cultural value as a result of disturbances.

Federal regulations require inventory, recordation, and evaluation of resources in the area of potential effect as part of the approval process for any surface disturbing activity. BLM prefers to avoid all effects on significant heritage resources. BLM would use GIS and other technologies to place surface disturbing activities in areas where they would be least intrusive to heritage resource values.

When avoidance is not possible, several mitigation measures could be applied to lessen the effects on heritage resources. Mitigation measures common to all alternatives include data recovery in the case of archaeological sites that are important because of the scientific information they contain. Mitigation might also include interpretive efforts, which would improve the public's ability to appreciate the resource in nearby areas. Data recovery and interpretation could have a beneficial effect for the public, because these efforts increase understanding and appreciation of our shared heritage. In some cases, interpretation and other measures that improve the public's ability to enjoy and appreciate heritage resources might also be appropriate.

Resources discovered during implementation of an undertaking would be documented and evaluated for eligibility for the NRHP, and mitigation, such as data recovery, site stabilization, or other appropriate measures, would be implemented to ensure protection of resource values. Sites not eligible for the NRHP would be managed on a case-by-case basis according to their values. The State Historic Preservation Office (SHPO) would be consulted under provisions of the National Historic Preservation Act, as implemented in the BLM-SHPO Protocol, on any potential effects on heritage resources (Appendix 7).

Native American traditional elders have identified a number of sites important for their traditional, sacred, or religious uses by Native peoples. Elders in this region have referred to these sites as "respected places." Surface disturbance and disruptive activities have the potential to affect these respected places and their associated viewsheds. These types of heritage resources differ from more typical archaeological and historical sites because of their sacredness to Native Americans and because adverse effects on the resources cannot be mitigated by recovery of scientific information. Federal mandates encourage BLM to

protect these places and to make accommodations to allow their use by Native American traditional people to the extent possible within the bounds of other appropriate regulations.

The significance of any adverse impact would depend on the importance of the resource (e.g., its eligibility for NRHP inclusion) and implementation of mitigation measures. On rare occasions, heritage resources might be of such importance that their protection might preclude other kinds of activity. Federal land users could be adversely affected if a proposed activity were not approved or would require modification to the extent the activity became economically infeasible.

Examples of heritage resources of unique significance within the planning area include the region of stabilized sand/silt sheet deposit north and west of White Mountain. This area, referred to as the paleosol deposition area, has very intact manifestations of some of the earliest cultures in North America, as exemplified by the Finley and Krmpotich sites. These sites include preserved cultural materials and Pleistocene and early Holocene faunal remains. These sites are tremendously important for the study of past environmental conditions and their effects on human adaptation over thousands of years. Surface disturbance would be controlled so as to manage the area to protect scientific values.

Paleontological resources are known in the planning area. Before surface disturbing activities, BLM would classify or rank the area according to its potential for containing significant fossils or noteworthy occurrences of invertebrate or plant fossils. Documented or located significant fossil sites would be avoided to protect scientific and educational values. If impacts could not be avoided, the site would be evaluated and surveyed (as needed) by a professional paleontologist. A mitigation plan, which could include activity monitoring, fossil documentation, recovery, and storage in a federally approved repository, would be coordinated with BLM before any surface disturbing activity could occur.

Fire suppression efforts would have beneficial effects by protecting standing historic structures; however, the use of heavy equipment and resulting surface disturbance could have adverse effects by disturbing the soil matrix, which could contain archaeological or historical resources. Fire retardant chemicals would not be allowed in the vicinity of rock art sites and some historic structures to protect their historic integrity. Fire changes the visual appearance of an area and thus could have short-term adverse effects on the historic setting of places, such as the South Pass Historic Landscape. On the other hand, fire was part of the natural ecosystem, and burning often restores a more natural landscape, which would have a beneficial effect on historic settings.

Actions associated with managing the wild horse program usually would not have any adverse impact on heritage resources. Consultation with tribal elders indicates that the presence of wild horses on BLM-administered lands is important to Native Americans. This is also illustrated by the images of horses in the Native American rock art at the White Mountain Petroglyphs sites. For these reasons, wild horses could almost be considered a heritage resource, and their appropriate management would represent a beneficial effect on traditional values.

Land exchanges and ownership adjustments could have an adverse effect on heritage resources located on the affected parcels. Resources could become vulnerable to impacts because historic preservation laws and procedures, such as inventory and avoidance, generally apply only to lands under federal jurisdiction. Changes in ownership could significantly alter land management practices. The State of Wyoming does not have extensive state laws protecting heritage resources; thus, land exchanges with the state could be adverse because of removal of the property from the protection of the National Historic Preservation Act and other federal laws. In addition, public access to important heritage resources could be adversely affected if access through privately owned land were precluded or made more difficult. Inventories and evaluations for heritage resources would be required prior to transferring lands from federal jurisdiction.

This would ensure adequate data recovery and documentation of the resource to minimize any adverse effect associated with the transfer and loss of federal protection.

Surface disturbing activities associated with the construction of linear ROWs for pipelines, transmission lines, communication lines, and oil and gas development could adversely affect heritage resources. Land clearing and grading activities necessary for construction remove vegetation, excavate and compact soils, and contribute to increased erosion that could expose buried archeological sites. Federal regulations require inventory, recordation, and evaluation of heritage resources in the area of potential effect as part of the approval process for any surface disturbing activity. Adverse impacts on heritage resources discovered during construction activities would be minimized by relocating the activity to avoid the resources or through proper mitigation if disturbance or destruction could not be avoided.

Special management area designations and associated management prescriptions, including ACECs, WSAs, and National Historic or Scenic Trails, would provide protection to heritage resources by limiting or controlling surface disturbing activities. These resources include a portion of the Killpecker Sand Dunes, White Mountain Petroglyphs, South Pass National Historic Landmark (including the Oregon, California, Mormon Pioneer, and Pony Express National Historic Trails), Boars Tusk, Crookston Ranch, and Tri-Territory Marker.

4.5.1.2 No Action Alternative

Heritage resources would remain protected through special management area designations (e.g., WSAs, National Historic Trails) and associated management prescriptions. These resources include a portion of Killpecker Sand Dunes, White Mountain Petroglyphs, South Pass Historic Landscape (including the Oregon, California, Mormon Pioneer, and Pony Express National Historic Trails), Boars Tusk, Crookston Ranch, and Tri-Territory Marker. Other areas could be included in the future as further NRHP-eligible sites are located and/or special management designations are considered.

Sites eligible for inclusion in the NRHP because of their scientific value would be protected. Preservation of the scientific information would be the preferred mitigation method if any such sites had to be affected by other activities. These sites include the Finley, Krmpotich, and Eden-Farson archaeological sites in the paleosol deposition area. Other sites will be included as they are located, recorded, and evaluated for NRHP eligibility.

Management actions associated with watershed quality, livestock grazing, wildlife, and vegetation would generally have indirect but beneficial impacts on heritage resources. Implementing the Wyoming Standards for Healthy Rangelands, meeting PFC standards, taking measures to achieve DPC objectives, and controlling or preventing surface disturbing activities in sensitive wildlife habitat would all contribute to improved range conditions, soil and vegetation stability, and decreased soil erosion.

Overuse of an area by livestock, wildlife, and/or wild horses could accelerate erosion and thus destroy the soil matrix, which might contain archaeological or historical resources. The wildlife management practices of imposing seasonal restrictions on OHV use within the greater sage-grouse nesting habitats could benefit the protection of historical resources through prevention of soil erosion. Proper construction of water developments and range improvements, and proper placement of salt and mineral supplements would help minimize adverse impacts on heritage resources. Areas would be inventoried and evaluated for heritage resources before any disturbance associated with the construction of fences, water developments, and range improvements, and appropriate mitigation measures would be implemented if needed. The amount of surface disturbance anticipated for such activities would not be significant and, based on the assumed densities of heritage resources, the likelihood of encountering previously unknown sites would be negligible.

Rock art sites and significant historic structures, such as those at Crookston Ranch, would be fenced to protect them from livestock and wildlife.

Management of travel and access could adversely affect heritage resources by facilitating access and use within the planning area. Heritage resources would be affected through direct human disturbance and, potentially, by unauthorized OHV use. However, providing for appropriate ingress, egress, and access routes through effective transportation planning would help reduce related impacts. In addition, limiting OHV use to existing roads and trails, and implementing seasonal limitations would minimize soil disturbance, thus helping prevent exposure of buried archaeological sites.

Heritage resources such as Boars Tusk, Crookston Ranch, and White Mountain Petroglyphs would be closed to OHV use to protect their scenic qualities and historic values.

Geophysical exploration activities could affect heritage resources through direct disturbance of such resources. Preauthorization inventory and avoidance would usually allow the geophysical operation to be conducted in a way that avoided effects on most heritage resources.

Approximately 1,800 acres of new surface disturbance could occur over the planning period as a result of projected oil and gas development activities (Appendix 13, Table A13-7). At the assumed densities for heritage sites of 3.2 sites per 640 acres, approximately 13 sites could potentially be affected. Other types of ROWs, such as communication sites and ROWs for salable minerals, could result in surface disturbances and effects to the setting of sites such as Native American respected places. ROWs proposed in proximity to Indian Gap, Monument Ridge, White Mountain, and the face of Steamboat Mountain, and around Native American respected places could have adverse impacts on these resources and would be avoided to the extent possible.

Withdrawals identified in the Green River Resource Management Plan (RMP) would be pursued. Withdrawing lands from locatable mineral development and revoking existing withdrawals would have impacts on the resources and resource users. The oil shale and coal classifications would be revoked and, upon revocation, the planning area would be open to filing of mineral claims, exploration, and development of locatable minerals. White Mountain Petroglyphs, Greater Sand Dunes ACEC, special status plant sites, Crookston Ranch, public water reserves, Tri-Territory Marker, and South Pass Summit would be withdrawn from mineral location before the revocation of the oil shale and coal classifications.

Preauthorization inventory and evaluation are not always required before some mining operations conducted pursuant to the 1872 Mining Act; thus, surface disturbance associated with mining claims could have the potential to destroy archeological and historical resources and affect historic settings such as the South Pass Historic Landscape. However, it is anticipated that fewer than 100 acres within the planning area would be disturbed over the planning period because of locatable mineral activity; thus, any adverse impact would likely be minimal. Where mining activities would disturb more than 5 acres of land, a plan of operations and a resource evaluation would be required. These measures would minimize potential impacts on heritage resources. A plan of operations would also be required for mining operations in ACECs, which would discuss project details relative to those areas.

Recreational management actions, such as implementation of public education and interpretive programs, would have beneficial effects by encouraging protection of heritage resources. The preparation of recreation project plans for the National Historic Trails, Crookston Ranch, Boars Tusk, and White Mountain Petroglyphs would benefit the users of these resources by providing interpretive materials on historical and cultural sites of interest. An inventory and evaluation of potential heritage resources would be completed before the expansion of facilities at the Sand Dunes OHV recreation site, minimizing the potential for any adverse impact on previously unknown resources. The projected increase in recreation

use of the planning area could have the potential to affect heritage resources. Any area that experienced increased recreational use would be closed if significant resource damage were observed. Some seasonal limitations on OHV use might restrict recreational use and therefore benefit heritage resources; however, these benefits would be limited because of the temporary nature of such restrictions.

Management of visual resources could have beneficial effects through the protection of viewsheds associated with historic resources, such as the National Historic Trails in the South Pass Historic Landscape, and sites of concern to Native Americans, such as White Mountain Petroglyphs. The Visual Resource Management (VRM) Class II designation for these locations would require structures and activities to be designed to retain the existing character of the landscape. Any Native American respected places located within VRM Class I or II areas could be adversely affected if noticeable changes to the landscape occurred. Consultation with Native American elders would help identify alternative measures to minimize impacts.

Management actions for special management areas would usually benefit heritage resources. Limitations on surface disturbing activities and other development, including communication sites, would help protect heritage resources from physical and visual impacts. Maintaining the South Pass Historic Landscape viewshed for approximately 3 miles in either direction from the National Historic Trail would have beneficial effects for recreation users of the trails and for the integrity of the historic resource. However, other resource users within the viewshed could be adversely affected. Use of GIS technologies to analyze the setting of the National Historic Trails through South Pass would assist in maximizing multiple use in the South Pass area while still protecting this historically significant viewshed. Allowing communication sites on Essex Mountain and Pacific Butte could have adverse effects on visual resources, particularly in areas identified as respected places by Native Americans. Application of GIS technologies to analyze visual settings could help maximize all uses in these areas while still protecting settings important to Native Americans.

4.5.1.3 Alternative 1

Heritage resources would remain protected through special management area designations (e.g., WSAs, National Historic Trails) and associated management prescriptions. These resources include a portion of Killpecker Sand Dunes, White Mountain Petroglyphs, South Pass Historic Landscape (including the Oregon, California, Mormon Pioneer, and Pony Express National Historic Trails), Boars Tusk, Crookston Ranch, and Tri-Territory Marker. Other areas could be included in the future as additional NRHP-eligible sites and/or special management prescriptions are considered.

Sites that are eligible for inclusion in the NRHP because of their scientific value (Appendix 7, Heritage Resources) would be protected. Preservation of scientific information would be the preferred mitigation method if any such sites had to be affected by other activities. These sites include the Finley, Krmpotich, and Eden-Farson archaeological sites and the paleosol deposition area. Many other significant archeological sites are located in the planning area, and it is anticipated that still more will be discovered during the life of this plan. As sites are located, they will be recorded and evaluated for NRHP eligibility. These provisions will apply to all sites determined to be eligible under Criterion D (Appendix 7).

Management actions associated with watershed quality, livestock grazing, wildlife, and vegetation would generally have beneficial impacts on heritage resources, similar to those under the No Action Alternative. The level of development activity and AUM use is expected to be greater under this alternative; thus, there would be greater potential for impacts on heritage resources. However, impacts would remain insignificant because of implementation of management tools to improve range conditions, improve soil and vegetation stability, and decrease soil erosion, and through mitigation measures to inventory, evaluate, avoid, or protect heritage resources.

Under this alternative, recreation management actions would have impacts similar to those under the No Action Alternative. Interpretive materials on the importance of protecting and preserving heritage resources would be prepared as necessary, including recreation project plans for the National Historic Trails, Crookston Ranch, Boars Tusk, and White Mountain Petroglyphs. This would benefit the users of these resources by providing interpretive materials on historical and cultural sites of interest. The Sand Dunes OHV recreation site would not be expanded; thus, inventory and evaluation of archeological resources would not be required. However, an indirect adverse impact could be anticipated if OHV use increased outside the recreation site because of lack of available open area for users. The projected increase in recreationists' use of the planning area could have the potential to affect heritage resources, but impacts would be minimized by closing popularly used areas if resource damage occurred. However, based on the assumed densities of heritage sites within the planning area, it would be unlikely that a significant impact would result.

Management of travel and access throughout the planning area could have adverse impacts on heritage resources similar to those under the No Action Alternative. The OHV designations would allow more travel on existing roads and trails, but significant adverse impacts would not be anticipated provided that users adhered to the designations. Heritage resources such as Boars Tusk, Crookston Ranch, and White Mountain Petroglyphs would remain closed to OHV use to protect their historical significance.

Geophysical exploration activities would be allowed throughout the planning area, subject to seasonal limitations and sensitive plant species locations. These activities could affect heritage resources, but preauthorization inventory and avoidance measures should minimize adverse impacts.

Surface disturbing activities associated with the construction and location of ROWs for pipelines, transmission lines, communication lines, roads, and oil and gas development activities could adversely impact heritage resources, much as they would under the No Action Alternative. Although additional land area would be available for ROWs, the potential for this impacting additional heritage resources would be small. Cultural resource inventory, recordation, and evaluation of heritage resources would be part of the approval process for any surface disturbing activity, and adverse impacts would be minimized by avoiding the resources or by proper mitigation if disturbance or destruction could not be avoided.

Approximately 2,100 acres of new surface disturbance could occur over the planning period for projected oil and gas development activities (Appendix 13, Table A13-7). At the assumed densities for heritage sites of 3.2 sites per 640 acres, approximately 15 sites could potentially be affected. Additional disturbance would be likely for other types of ROWs, such as alternative energy developments, communication sites, and mineral material sales, but the number of acres affected would not be so significant as to increase the number of potentially affected heritage sites. Any ROWs proposed in proximity to Native American respected places could have adverse impacts on these resources; therefore, ROWs would not be allowed within one-quarter mile of these places. As under the No Action Alternative, the significance of any adverse impact would depend on the significance of the resource and the implementation of mitigation measures.

The paleosol deposition area is of unique significance to the planning area because of its intact manifestations of some of the earliest cultures in North America, as exemplified by the Finley and Krmpotich sites. This area would be managed to protect scientific values, as under the No Action Alternative. The requirement for special testing strategies in this area would also help minimize the potential for impacting sites in this depositional regime.

The oil shale and coal classifications would be revoked, and upon this revocation, the planning area, with the exception of White Mountain Petroglyphs, would be open to the filing of mineral claims, exploration,

and development of locatable minerals. This could have adverse impacts on heritage resources if the revocations resulted in significant increases in mining activity.

As under the No Action Alternative, preauthorization inventory and evaluation would not always be required before mining operations affecting fewer than 5 acres, conducted pursuant to the 1872 Mining Act. Surface disturbance associated with mining claims could have the potential to destroy archeological and historical resources and affect historic settings, such as the South Pass Historic Landscape. Although a majority of the planning area would be open for mineral location, fewer than 100 acres would be expected to be disturbed over the planning period because of available resources and demand for those resources. Thus, any adverse impact would likely be quite minimal.

Management actions for visual resources under this alternative could have adverse effects on protection of the visual quality of historic resources and Native American respected places. Most of the planning area would be classified as VRM Class IV, which would allow major modifications to the landscape character.

Although the management actions for special management areas would benefit heritage resources, this alternative would reduce the land area receiving these protections by removing the ACEC designation from Steamboat Mountain. Limitations on surface disturbing activities and other development would help protect heritage resources from physical and visual impacts, but allowing communication sites on Steamboat Mountain could adversely impact visual resources, particularly in areas identified as respected places by Native Americans. The South Pass Historic Landscape viewshed would be reduced to approximately 1 mile in both directions from the National Historic Trail. This could adversely affect both the users of the trail and the historic integrity of the South Pass area if surface disturbing activities and visual intrusions were to increase.

4.5.1.4 Alternative 2

Heritage resources would remain protected through special management area designations (e.g., WSAs, ACECs, and National Historic Trails) and associated management prescriptions. These resources include a portion of Killpecker Sand Dunes, Indian Gap, White Mountain Petroglyphs, South Pass Historic Landscape (including the Oregon, California, Mormon Pioneer, and Pony Express National Historic Trails), Boars Tusk, Crookston Ranch, and Tri-Territory Marker. Other areas could be included in the future as additional NRHP-eligible sites and/or special management designations are considered.

Management actions associated with watershed quality, livestock grazing, wildlife, and vegetation would generally have indirect but beneficial impacts on heritage resources, like those under the No Action Alternative. The additional protective measures for wildlife under this alternative could have beneficial effects on heritage resources by increasing the amount of area protected from surface disturbing activities.

Recreational management actions would have impacts similar to those under the No Action Alternative. Additional interpretive materials on the importance of protecting and preserving heritage resources would be prepared, including recreation project plans for the National Historic Trails, Crookston Ranch, Boars Tusk, White Mountain Petroglyphs, and Native American sites such as Indian Gap. The Indian Gap Trail would be researched and mapped, and an interpretive plan would be prepared. This would benefit users of these resources by providing educational materials on historical and cultural sites of interest. The Sand Dunes OHV recreation site would not be expanded; therefore, inventory and evaluation of archaeological resources would not be required (as under Alternative 1). However, an indirect adverse impact could be anticipated if OHV use increased outside the recreation site because of lack of available open area for users. This impact could also be influenced by the closure of OHV use in the greater sage-grouse winter range. Any adverse impacts on heritage resources due to ground disturbance from camping activities

would be minimized and monitored through a permit program. Areas might be closed to OHV use if significant resource damage were observed.

Travel and access throughout the planning area could have adverse impacts on heritage resources similar to those under the No Action Alternative. However, impacts would be reduced through implementation of a transportation plan providing maximum protection of sensitive resources. Moreover, limiting OHV use to designated roads and trails and closing more areas to OHV use would minimize soil disturbance and compaction and thus minimize erosion that could expose previously unknown resources. Boars Tusk, Crookston Ranch, White Mountain Petroglyphs, the greater sage-grouse winter range, and the paleosol deposition area would be closed to OHV use to protect their uniqueness and sensitive resources.

Geophysical exploration activities would be excluded from a majority of the planning area; thus impacts on heritage resources would be avoided.

Surface disturbing activities associated with the construction and location of ROWs could adversely affect heritage resources in much the same way that they would under the No Action Alternative; however, because less land area would be available for ROWs, the potential for significantly impacting heritage resources would be low based on the assumed densities of sites within the planning area. Approximately 1,300 acres of new surface disturbance could occur over the planning period for projected oil and gas development activities (Appendix 13, Table A13-7). At the assumed densities for heritage sites of 3.2 sites per 640 acres, fewer than 10 sites could be affected. Any ROWs proposed in proximity to Indian Gap, Monument Ridge, White Mountain, the face of Steamboat Mountain, and Native American respected places could have adverse impacts on these resources and therefore would be avoided to the extent possible. Native American elders would be consulted to determine the viewshed necessary to protect respected places from surface disturbing or disruptive activities. As with the other alternatives in this plan, inventory, recordation, and evaluation of heritage resources would be part of the approval process for any surface disturbing activity, and adverse impacts would be minimized by avoiding the resources or by appropriate mitigation if disturbance or destruction could not be avoided.

The Greater Sand Dunes ACEC would be expanded to include the paleosol deposition area. This area has intact manifestations of some of the earliest cultures in North America, as exemplified by the Finley and Krmpotich sites. Because of its importance to archeological science, the expanded ACEC would be evaluated as a research natural area (RNA). An RNA designation is for areas that contain important ecological and scientific values; these areas would be managed for minimum human disturbance. This designation would benefit this unique heritage resource by maintaining the area for the primary purpose of research and education.

The entire planning area would be withdrawn from the filing of mining claims, exploration, and development for locatable minerals (including recreational use), salable minerals, and coal exploration and development. This would have an overall beneficial effect on heritage resources by eliminating these surface disturbing activities.

Management actions for visual resources would benefit the visual quality of historic resources and Native American respected places. Most of the planning area would be classified as VRM Class I or II; thus, development would be designed to retain the existing character of the landscape.

The benefits to heritage resources from proposed actions for special management areas would be similar to those under the No Action Alternative. However, under this alternative, the benefits would be even greater because additional areas would be designated. Management prescriptions associated with ACEC expansion areas and greater sage-grouse winter range would provide protections to sensitive resources, including heritage resources. Limitations on surface disturbing activities and other development,

including communication sites, would help protect heritage resources from physical and visual impacts. Increasing the South Pass Historic Landscape viewshed to 5 miles in both directions from the National Historic Trail would have beneficial effects for both the users of the trail and the historical integrity of the South Pass area. However, other users wanting to engage in development activities within the viewshed could be adversely impacted, as they would be under the No Action Alternative. Effects on those users would be greater under this alternative because larger areas would be managed more restrictively.

4.5.1.5 Alternative 3

Heritage resource sites eligible for the NRHP would be protected and managed in accordance with the National Historic Preservation Act and Archaeological Resources Protection Act (ARPA). Pursuant to the protocol agreement between BLM and the Wyoming SHPO (Appendix 7), sites eligible for inclusion in the NRHP because of their scientific information content would be surrounded by a 100-foot avoidance area. Expansion era roads and associated sites eligible for the NRHP would be protected from activities that would affect their NRHP eligibility status. Activities on the roads and sites may be limited on a case-by-case basis. Consideration would be given to nominating for listing the contributing portions of expansion era roads and associated sites eligible for the NRHP. This would have beneficial effects on both the heritage resources and the users of these resources.

Management actions associated with watershed quality, livestock grazing, wildlife, and vegetation would generally have beneficial impacts on heritage resources, similar to those of the No Action Alternative and Alternative 2. The additional protection measures for wildlife could have beneficial effects on heritage resources by increasing the amount of area protected from surface disturbing activities.

Recreation management actions would have impacts similar to those under Alternative 2. Interpretive materials on the importance of protecting and preserving heritage resources would be prepared. Indirect adverse impacts could be anticipated if OHV use increased outside the recreation site because of lack of available open area for users. Disturbance from camping activities would be minimized and monitored through a permit program to minimize any potential effect on previously unknown resources.

Travel and access throughout the planning area could have adverse impacts on heritage resources similar to those under the No Action Alternative. However, impacts would be slightly reduced under this alternative through implementation of a transportation plan that provides for maximum protection of sensitive resources. In addition, limiting OHV use to existing and designated roads and trails, limiting seasonal access, and closing some sensitive plant and wildlife areas would minimize soil disturbance and associated erosion that could expose previously unknown resources.

Geophysical activities could have adverse impacts on heritage resources, similar to those under Alternative 2. Impacts would be slightly greater under Alternative 3, however, because this type of activity would be excluded from fewer areas than under Alternative 2. Preauthorization inventory and avoidance measures would help minimize adverse impacts.

Potential adverse impacts on heritage resources from surface disturbing activities associated with the construction and location of ROWs would be similar to those under the No Action Alternative. However, less land area would be available for ROWs; thus, the potential for significant impacts on heritage resources would be minimal. Approximately 1,600 acres of new surface disturbance could occur over the planning period for projected oil and gas development activities (Appendix 13, Table A13-7). At the assumed densities for heritage sites of 3.2 sites per 640 acres, fewer than 12 sites potentially could be affected. ROWs would be avoided in areas in close proximity to Indian Gap, Monument Ridge, White Mountain, the face of Steamboat Mountain, and Native American respected places, providing a benefit to these resources. As with all of the management alternatives, inventory, recordation, and evaluation of

heritage resources would be part of the approval process for any surface disturbing activity. Adverse impacts would be minimized by avoiding the resources, or by proper mitigation if disturbance or destruction could not be avoided.

The Greater Sand Dunes ACEC would be expanded to include the paleosol deposition area. This area has intact manifestations of some of the earliest cultures in North America, as exemplified by the Finley and Krmpotich sites, and warrants the added protection of the ACEC designation. Surface disturbing activities would be allowed only if appropriate archeological inventory, testing, and data recovery could ensure that there would be no adverse impacts on the resource.

The majority of the planning area would be open to the filing of mineral claims, exploration, and development of locatable minerals. This could have adverse impacts on heritage resources if significant increases in mining activity occurred. Surface disturbance associated with mining claims could potentially impact archeological and historical resources. Mining in the areas most likely to support mining activity (South Pass Summit and Steamboat Mountain) could also affect historic settings and Native American respected places. Therefore, those areas would be withdrawn from mineral location. Pursuant to the 1872 Mining Act, preauthorization inventory and evaluation would not be required before mining operations that would affect fewer than 5 acres (unless located in a special management area). However, no significant impacts would be expected because the available mineral resource with the most demand would be withdrawn. The White Mountain Petroglyphs would also be withdrawn from mineral location; thus, there would be no impact on this Native American rock art site.

Management of visual resources would have beneficial effects on the visual quality of historic resources and Native American respected places. Approximately two-thirds of the planning area would be classified as VRM Class I or II; thus, development would be designed to retain the existing character of the landscape. Native American respected places located with VRM Class IV areas could be adversely affected if noticeable changes to the landscape occurred. However, consultation with Native American elders would help identify alternative measures to minimize any impact.

Special management areas would benefit heritage resources because management prescriptions generally limit surface disturbing activities and other development, including communication sites. Management actions associated with expansion of existing ACECs and designation of additional ACECs would provide protections to sensitive resources, including heritage resources. Maintaining the South Pass Historic Landscape viewshed at 3 miles in both directions from the National Historic Trail would have beneficial effects on both the users of the trail and the historical integrity of the South Pass area. However, other resource users wanting to engage in development activities within the viewshed could be adversely impacted, as they would under the No Action Alternative.

4.5.1.6 Proposed JMH CAP

Direct impacts on heritage resources would be from surface disturbing activities and soil compaction, whereas indirect impacts could occur as a function of increased erosion, easier access, vibration from vehicles and equipment, or alteration of the setting associated with certain heritage resources. Impacts on heritage resources could include loss of scientific and historical information, integrity, and cultural value. Federal regulations require inventory, recordation, and evaluation of resources in the area of potential effect as part of the approval process for any surface disturbing activity. BLM prefers to avoid all effects on significant heritage resources. BLM would use GIS and other technologies to place surface disturbing activities in areas where they would be least intrusive to heritage resource values.

When avoidance is not possible, several mitigation measures could be applied to lessen the effects on heritage resources. Mitigation measures common to all alternatives include data recovery in the case of

archeological sites that are important because of the scientific information they contain. Mitigation might also include interpretive efforts, which would improve the public's ability to appreciate the resource in nearby areas. Data recovery and interpretation could have a beneficial effect for the public because these efforts increase understanding and appreciation of our shared heritage. In some cases, interpretation and other measures that improve the public's ability to enjoy and appreciate heritage resources might also be appropriate.

Resources discovered during implementation of an undertaking would be documented and evaluated for eligibility for listing in the NRHP. Mitigation, such as data recovery, site stabilization, or other appropriate measures, would be implemented to ensure protection of resource values. Sites not eligible for the NRHP would be managed on a case-by-case basis according to their values. The SHPO would be consulted under provisions of the National Historic Preservation Act, as implemented in the BLM-SHPO Protocol, on any potential effects concerning heritage resources (Appendix 7).

Native American traditional elders have identified a number of sites that are important for their traditional, sacred, or religious uses by Native peoples. Elders in this region have referred to these sites as "respected places." Surface disturbance and disruptive activities have the potential to affect these respected places and their associated viewsheds. These types of heritage resources differ from more typical archeological and historical sites because of their sacredness to Native Americans, and also because adverse effects on the resources could not be mitigated by the recovery of scientific information. Federal mandates encourage BLM to protect these places and to make accommodations to allow their use by Native American traditional people to the extent possible within the bounds of other appropriate regulations.

The significance of any adverse impact would depend on the importance of the resource (e.g., its eligibility for NRHP inclusion) and the implementation of mitigation measures. On rare occasions heritage resources might be of such importance that their protection might preclude other kinds of activity. Federal land users could be adversely affected if a proposed activity were not approved or would require modification to the extent that it became economically infeasible.

Examples of heritage resources of unique significance within the planning area include the region of stabilized sand/silt sheet deposit north and west of White Mountain. This area, referred to as the paleosol deposition area, has very intact manifestations of some of the earliest cultures in North America, as exemplified by the Finley and Krmpotich sites. These sites include preserved cultural materials and Pleistocene and early Holocene faunal remains. The sites are tremendously important for the study of past environmental conditions and their effects on human adaptation over thousands of years. Surface disturbance would be controlled so as to manage the area to protect scientific values.

Paleontological resources are known in the planning area. The effects of surface disturbing activities such as soil erosion, compaction, and vibration, and allowing access into or adjacent to these sensitive areas, would impose adverse impacts on these sensitive resources. The impacts would most likely come from unauthorized access to the area or even from wildlife that could potentially damage sensitive geologic information. Before surface disturbing activities, BLM would classify or rank the area according to its potential to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils. Documented vertebrate fossil sites would be avoided to protect scientific and educational values. Fencing and signage might be used to mitigate open access to some extent, but if impacts could not be avoided, the site would be evaluated and surveyed (as needed) by a professional paleontologist. A mitigation plan, fossil documentation, recovery, and storage in a federally approved repository would be coordinated with BLM before any surface disturbing activity could occur.

Fire suppression efforts would have beneficial effects on heritage resources by protecting standing historic structures. However, the use of heavy equipment and the resulting surface disturbance could have adverse effects by disturbing the soil matrix, which could contain archeological or historical resources. Fire retardant chemicals would not be allowed in the vicinity of rock art sites and some historic structures to protect their historic integrity. Fire changes the visual appearance of an area and thus could have short-term adverse effects on the historic setting of places such as the South Pass Historic Landscape. On the other hand, fire was part of the natural ecosystem, and burning often restores a more natural landscape, which would have a beneficial effect on historic settings.

Actions associated with managing the wild horse program usually would not have any adverse impact on heritage resources. Consultation with tribal elders indicates that the presence of wild horses on BLM-administered lands is important to Native Americans. The heritage value of horses is also illustrated by the number of horses in the Native American rock art at the White Mountain Petroglyphs site. For these reasons, wild horses could almost be considered a heritage resource; thus, their appropriate management would have a beneficial effect on traditional values.

Management actions associated with watershed quality, livestock grazing, wildlife, and vegetation would generally have an indirect beneficial effect on heritage resources. Implementing the Wyoming Standards for Healthy Rangelands, meeting PFC standards, taking measures to achieve DPC objectives, and controlling or preventing surface disturbing activities in sensitive wildlife habitat would all contribute to improved range conditions, soil and vegetation stability, and decreased soil erosion.

Overuse of an area by livestock, wildlife, and/or wild horses could accelerate erosion, destroying the soil matrix, which could contain archeological or historical resources. Proper construction of water developments and range improvements, and proper placement of salt and mineral supplements, would help minimize adverse impacts on heritage resources. Areas would be inventoried and evaluated for heritage resources before any disturbance associated with the construction of fences, water developments, and range improvements, thus mitigating related impacts. The amount of surface disturbance anticipated for such activities would not be significant and, based on the assumed densities of heritage resources, the likelihood of encountering previously unknown sites would be negligible. Rock art sites and historic structures, such as those at Crookston Ranch, would be fenced to exclude livestock and wildlife.

Recreation management actions such as implementation of public education and interpretive programs could have significant beneficial effects through encouraging protection of heritage resources. Preparation of recreation project plans for the National Historic Trails, Crookston Ranch, Boars Tusk, and White Mountain Petroglyphs would benefit the users of these resources by providing interpretive materials on historical and cultural sites of interest. For example, the location of interpretive and directional signage along backcountry byways would be coordinated with state and local governments. The projected increase in recreational use of the planning area could have the potential to adversely affect heritage resources through increased soil compaction, vegetation removal, and subsequent erosion of archeological sites. Any area experiencing increased recreational use would be closed if significant resource damage were observed. An inventory and evaluation of potential heritage resources would be completed before the expansion of facilities, minimizing the potential for any adverse impact on previously unknown resources. However, based on the assumed densities of heritage sites within the planning area, it would be unlikely that a significant impact would result. Overall management plans for specific heritage resource areas would have significant beneficial effects on the physical integrity of the resource as well as for users of these resources.

Travel and access could adversely affect heritage resources by facilitating access and use within the planning area. Heritage resources would be affected through direct human disturbance and, potentially, unauthorized OHV use. However, providing for appropriate ingress, egress, and access routes through

effective transportation planning would help reduce related impacts. In addition, limiting OHV use to existing roads and trails would minimize soil disturbance, thus helping prevent exposure of buried archeological sites. Heritage resources such as WSAs, Boars Tusk, Crookston Ranch, special status plant sites, the Oregon Buttes ACEC, the Pinnacles Geologic Feature, and the White Mountain Petroglyphs ACEC would be closed to OHV use to protect their scenic qualities and historic values. Impacts could be slightly less than under the No Action Alternative because of implementation of a transportation plan specific to the planning area, ROW avoidance areas within the greater sage-grouse nesting habitat, and the Pinnacles Geologic Feature ROW exclusion area. Again, management of access in these areas would benefit heritage resources as well as natural resources of all kinds.

Geophysical exploration activities could adversely affect heritage resources. However, preauthorization inventory and avoidance could usually allow the geophysical operation to be conducted in a manner that would avoid effects on most heritage resources.

Land exchanges and ownership adjustments could have an adverse effect on heritage resources located on the affected parcels. Resources could become vulnerable to impacts because historic preservation laws and procedures such as inventory and avoidance generally apply only to lands under federal jurisdiction. Changes in ownership could significantly alter land management practices. Because the State of Wyoming does not have extensive state laws protecting heritage resources, land exchanges with the state could have adverse effects through removal of the property from the protection of the National Historic Preservation Act and other federal laws. In addition, public access to important heritage resources could be adversely affected if access through privately owned land were precluded or made more difficult. Inventories and evaluations for heritage resources would be required before transferring lands from federal jurisdiction. This would ensure adequate data recovery and documentation of the resource to minimize any adverse effect associated with the transfer and loss of federal protection.

Surface disturbing activities associated with the construction of linear ROWs for pipelines, transmission lines, communication lines, and oil and gas development could adversely affect heritage resources. Land clearing and grading activities necessary for construction remove vegetation, excavate and compact soils, and contribute to increased erosion that could expose buried archeological sites. Preauthorization inventory and avoidance would usually allow operations to be conducted in a way that would avoid effects on most heritage resources. As with all of the alternatives, federal regulations would require inventory, recordation, and evaluation of heritage resources in the area of potential effect as part of the approval process for any surface disturbing activity. Adverse impacts on heritage resources discovered during construction activity would be minimized by relocating the activity to avoid the resources, or through proper mitigation if disturbance or destruction could not be avoided.

As under Alternative 3, approximately 1,600 acres of new surface disturbance is anticipated over the planning period for projected oil and gas development activities (Appendix 13, Table A13-7). At the assumed densities for heritage sites of 3.2 sites per 640 acres, approximately 13 sites could potentially be affected. These impacts could be reduced in Area 3 (Figure A17-1) of the JMH CAP fluid mineral leasing implementation strategy (Appendix 17). The majority of Area 3 would be closed to new oil and gas leasing, which could result in fewer disturbances of heritage resources in this area. Over the long term, impacts in Area 3 would be minimized because all leases in this area would expire within an 11-year time period. Other types of ROWs, such as communication sites and salable minerals operations, could result in surface disturbance and effects on the setting of sites, such as Native American respected places. Any ROWs proposed in proximity to Indian Gap, Monument Ridge, White Mountain, the face of Steamboat Mountain, and Native American respected places could have adverse impacts on these resources and thus would be avoided to the extent possible.

Proposed withdrawals from locatable minerals identified in the Green River RMP would be pursued. Withdrawing of lands from locatable mineral development and revoking existing withdrawals would have beneficial impacts on heritage resources and resource users. Any mineral withdrawals would benefit heritage resource management by preventing vegetation removal, soil erosion and compaction, and vibration of significant heritage resources. The White Mountain Petroglyphs, Greater Sand Dunes ACEC, special status plant sites, Crookston Ranch, public water reserves, Tri-Territory Marker, Pinnacles Geologic Feature, and South Pass Summit would be withdrawn from mineral location before revocation of the oil shale and coal classifications. Preauthorization inventory and evaluation are not always required before some mining operations conducted pursuant to the 1872 Mining Act; thus surface disturbance associated with mining claims could have the potential to destroy archeological and historical resources and affect historic settings, such as the South Pass Historic Landscape. Where mining activities would disturb more than 5 acres of land, a plan of operations and a resource evaluation would be required. These measures could minimize potential impacts on heritage resources. A plan of operations would also be required in special management areas, which also would minimize the potential impact on heritage resources.

Management of visual resources could have beneficial effects through the protection of viewsheds associated with historic resources (e.g., South Pass Historic Landscape), and Native American sites (e.g., White Mountain Petroglyphs). The VRM Class II designation for these locations would require that structures or activities be designed to retain the existing character of the landscape. Native American respected places located within VRM Class I or II areas could be adversely affected if noticeable changes to the landscape occurred. Consultation with Native American elders would help identify alternative measures of minimizing impacts.

Special management area designations and associated management prescriptions, including ACECs, WSAs, and National Historic or Scenic Trails, would provide protection to heritage resources by limiting or controlling surface disturbing activities. These resources include a portion of Killpecker Sand Dunes, White Mountain Petroglyphs, South Pass National Historic Landmark (including the Oregon, California, Mormon Pioneer, and Pony Express National Historic Trails), Boars Tusk, Crookston Ranch, and Tri-Territory Marker. Appropriate limitations on surface disturbing activities and other developments, including communication sites, would help protect heritage resources from physical and visual impacts. For example, communication sites would be prohibited in the Steamboat Mountain ACEC but would be considered on Essex Mountain and Pacific Butte, provided that appropriate mitigation measures could be implemented to meet VRM prescriptions. Maintaining the South Pass Historic Landscape viewshed at approximately 3 miles in each direction from the center of the National Historic Trail would also have beneficial impacts on both the users of the trail and the historic integrity of the historic trails setting. However, other resource users wanting to engage in development activities within the viewshed could be adversely affected.

4.6 TRAVEL, ACCESS, AND REALTY

This resource management category includes the land use programs of transportation, OHV use, lands and realty management, ROWs, and access routes and issues.

4.6.1 Potential Impacts on Travel, Access, and Realty

The land use programs of travel, access, and realty have environmental impacts on resources, and nonenvironmental effects on resource users. Impacts on resources and resource users resulting from implementation of these programs are discussed in those particular resource sections. This section describes potential impacts on the land use programs of travel, access, and realty resulting from the implementation of management actions for other resource management categories.

An impact would be considered significant if the implementation of management actions would compromise public health and safety, limit reasonable public access and use of the planning area, cause economic hardship for developers, and/or have adverse effects on state or private inholdings.

For analysis purposes, it is assumed that the majority of ROW locations are the result of development in the area. Exchanges of public land for state lands in sensitive resource areas would be pursued, and access to state and private inholdings would be maintained.

4.6.1.1 Common to All Alternatives

For the area of travel, access, and realty, the management actions associated with the alternatives would primarily affect where and when access to and travel within the JMH CAP planning area would be allowed, and where ROWs and other realty actions would be permitted. The limitations placed on travel, access, and realty management and related users would depend on locations of sensitive resources and measures used to protect those resources.

Management of water, vegetation, and wildlife resources would place restrictions on access, travel, and realty actions within the planning area, thereby impacting related users. Such restrictions could affect OHV use, general travel within the planning area, access to remote locations, ROW developments, land exchanges, and other realty actions. Impacts are not expected to be significant because many of the restrictions designed to protect land and water resources are implemented on a seasonal basis. ROW windows have been identified in the Green River RMP for areas outside the JMH CAP planning area that provide opportunities for placement of major transmission facilities.

Land adjustments and exchanges identified in the Green River RMP would be pursued, including exchange of state lands within WSAs and other special management areas. Acquiring state inholdings and other lands would likely result in beneficial impacts on travel, access, and realty management because BLM could implement cohesive management practices and reduce fragmentation of the planning area. Similar benefits could occur to the state or private party receiving lands in the exchange. Certain lands (e.g., areas with wetland and riparian habitat) would not be considered for disposal unless exchanged for lands of equal or better value (including functional resource value and monetary value). Mineral development activities would generally benefit and increase travel and access within the planning area through the development of additional roads needed to access drilling locations. However, such development could create health and safety risks to OHV users if pipelines became exposed in areas of shifting sand, which could have a significant adverse impact on users.

Visual resources management would adversely impact travel, access, and realty management by imposing restrictions on surface use and surface occupancy via VRM classifications, which serve to retain the existing character of the landscape. These restrictions could affect OHV use, general travel within the planning area, ROW developments, and other realty actions. Specifically, restrictions related to VRM classifications could increase project costs related to ROW developments and geophysical activities. An impact would be significant if a project were abandoned because expected costs outweighed projected benefits.

4.6.1.2 No Action Alternative

Management actions designed to protect water, vegetation, and wildlife resources would generally have adverse effects on travel, access, and realty management. Such actions include limitations on surface disturbing and disruptive activities in the form of designated avoidance areas, surface use stipulations, and specific mitigation measures. The area within 500 feet of riparian areas and wetlands, areas containing highly erodible soils, potential habitat for and known locations of special status species, and other

sensitive wildlife habitat would all be subject to surface disturbance restrictions, which would place limitations on access and use within the planning area and could increase costs to the permittee.

Transportation planning would result in beneficial impacts on travel, access, and realty management by providing for appropriate ingress, egress, and access routes that would follow BLM guidelines and the road classifications defined in the Green River RMP (Appendix 12). Arterial roads would be high-traffic-volume roads that would provide primary access to the planning area; collector roads would provide access to large blocks of land; local roads would serve smaller areas; and resource roads would provide access to resource locations. Implementing OHV use designations and related seasonal closures would affect users by limiting travel within the planning area. However, impacts are expected to be minimal because existing and designated roads and trails provide adequate vehicle access throughout the planning area.

Geophysical activities would be required to conform to OHV use designations for minimizing adverse impacts on vegetation and other sensitive resources. This would affect applicants because of the nature of exploration activities. Limiting exploration activities to existing roads and trails could keep applicants from exploring in a grid pattern, and therefore could make it uneconomical to conduct exploration if portable techniques could not be used.

Areas that excluded or limited ROWs would cover approximately one-third of the planning area under this alternative. Applicants for ROWs would have to avoid another 30 percent of the planning area or apply additional mitigation to protect sensitive resource values. Such limitations could create increased costs and have an adverse economic impact on applicants by requiring a longer route to avoid these areas. This, in turn, could create additional surface disturbances, which could require additional mitigation and funds to construct the longer route. Moreover, construction would be subject to seasonal limitations in approximately half of the planning area, which could affect the timing (and therefore the cost) of ROW developments. An impact would be significant if a project were abandoned because the expected costs outweighed the benefits of acquiring the ROW.

4.6.1.3 Alternative 1

Management actions for water, vegetation, and wildlife resources would be less restrictive under this alternative, which would reduce adverse impacts on travel, access, and realty management compared with the No Action Alternative. Reducing the avoidance area around wetlands and riparian areas to 250 feet, limiting protections to special status plant and wildlife species, and eliminating surface disturbance restrictions in big game winter range and birthing areas would result in an increased level of access and use within the planning area.

As under the No Action Alternative, transportation planning would result in beneficial impacts on travel, access, and realty management by providing for appropriate ingress, egress, and access routes. OHV use designations would be less restrictive to users because fewer areas would be limited to designated roads and trails or have seasonal access limitations. This would increase access to existing roads and trails, thereby increasing the amount of area available to OHV users.

Geophysical activities would not be subject to OHV use designations, as required in the No Action Alternative. Geophysical activities would be allowed throughout the planning area, subject to seasonal limitations and sensitive plant species locations. This would reduce adverse impacts because users would be able to conduct economical exploration activities generally in a grid design and by portable techniques as necessary.

Applicants would have greater flexibility and opportunity for locating and routing ROWs than they would under the No Action Alternative. Placement of ROWs would be limited in areas designated as NSO, in exclusion or avoidance areas, by seasonal limitations, and by VRM classifications. Impacts on users would likely be less than under the other alternatives, because more land area would be available for ROWs.

Of the five alternatives, this alternative would provide the greatest level of mineral development, resulting in increased benefits to travel, access, and realty management compared with the other alternatives. Although existing roads and trails provide adequate vehicle access, anticipated development of existing and new leases would likely create additional access routes for users of the planning area. However, increased oil and gas development could create health and safety risks to OHV users if pipelines became exposed in areas of shifting sand, which could have a significant adverse impact on users.

Restrictions on surface use and surface occupancy imposed by VRM classifications would be least restrictive under this alternative. VRM Class II and III areas would be reduced in size, and VRM Class IV areas would increase by at least 120,000 acres over the other alternatives (Table 4-1 and Map 25). This would reduce related impacts on OHV use, travel within the planning area, ROW developments, and other realty actions.

4.6.1.4 Alternative 2

Management actions for water, vegetation, and wildlife resources would be more restrictive under this alternative, which would increase adverse impacts compared with the No Action Alternative. Increasing the avoidance area around wetlands and riparian areas to one-quarter mile, increasing protections to special status plant and wildlife species, and increasing surface disturbance restrictions in big game birthing areas would result in increased restrictions on travel, access, and realty management, thereby reducing the level of access and use within the planning area.

Transportation planning under this alternative would provide for appropriate access routes to provide maximum protection for crucial habitats and sensitive resources. This would limit access and could close roads in the planning area. Implementation of such a transportation plan could have significant adverse impacts on users if areas were no longer accessible by vehicles, and travel time would increase because more direct routes would not be available. Travel management plans would be developed in conjunction with transportation planning efforts to control development within Steamboat Mountain ACEC, White Mountain, the two northern birthing areas, and Essex Mountain. This could adversely affect users if access distance became too lengthy or costly, or was eliminated entirely, which could effectively preclude development.

OHV use designations would be more restrictive under this alternative, closing approximately 70 percent of the planning area because of sensitive or unique resources (Map 30). Moreover, the facilities at the Greater Sand Dunes Recreation Area would not be expanded or improved. This would adversely affect OHV users because much of the planning area would not be accessible by vehicle, and users would have to travel farther to access certain locations. This could also deter OHV use in the planning area, which could lessen the health and safety risks posed by oil and gas development. Geophysical activities would be excluded from areas with NSO requirements and areas with sensitive or unique resource values. This could result in significant adverse impacts on users because these designations encompass much of the planning area, leaving a limited amount of area for geophysical activities. Seasonal limitations would also apply to these activities, further affecting exploration operations.

Placement of ROWs would be limited in areas with sensitive or unique resources; seasonal limitations; and NSO, exclusion, or avoidance stipulations, which cover a majority of the planning area. This would

provide extremely limited opportunities for locating and routing ROWs through the planning area. Impacts on users would be significant because it would likely be uneconomical to locate a ROW through much of the planning area with adequate mitigation or while avoiding sensitive resources.

This alternative allows the least amount of mineral development of the five alternatives, thereby decreasing benefits to travel and access opportunities. Decreased development of existing and new leases would result in forgone opportunities to develop additional access routes. However, decreased oil and gas development could reduce the health and safety risks to OHV users associated with exposed pipelines in areas of shifting sand.

Restrictions on surface use and surface occupancy imposed by VRM classifications would be the most restrictive under this alternative. Most of the planning area (over 400,000 acres) would be designated a VRM Class I area; there would be very few VRM Class III areas and no VRM Class IV areas (Table 4-1 and Map 36). This would increase related impacts on OHV use, travel within the planning area, ROW developments, and other realty actions.

4.6.1.5 Alternative 3

Management actions designed to protect water, vegetation, and wildlife resources would generally have adverse effects on travel, access, and realty management. Such actions include limitations on surface disturbing and disruptive activities (including OHV use) in the form designated avoidance areas, surface use stipulations, and specific mitigation measures. The area within 500 feet to one-quarter mile of wetlands and riparian areas, areas containing highly erodible soils, potential habitat for and known locations of special status species, and other sensitive wildlife habitat would all be subject to surface disturbance restrictions, which would place limitations on access and use within the planning area. Impacts would be slightly less than under the No Action Alternative because of moderate increases in restrictions on surface disturbing and disruptive activities.

Transportation planning would follow BLM guidelines and road classifications to provide maximum protection for crucial habitats and sensitive resources. This would limit access through seasonal road closures and/or gating to limit frequency of access in crucial wildlife habitat. Reroutes or rehabilitation of existing roads and trails could have significant adverse impacts on users if areas were no longer accessible by vehicle, travel time increased because more direct routes were not available, or construction and maintenance of roads to meet management objectives were more costly. A travel management plan would be developed specifically to manage access in the Steamboat Mountain and White Mountain areas. This could adversely affect users if access distance became too lengthy or costly. Implementing OHV use designations and related seasonal closures would affect users by limiting travel within the planning area. Such impacts would be slightly greater than under the No Action Alternative because more areas would be closed to OHV use and subject to seasonal limitations.

Geophysical activities would be excluded from areas with NSO requirements (Map 39) and sensitive or unique resource values, as under Alternative 2. Significant adverse impacts on users would be likely if these designations effectively precluded geophysical exploration activities; however, exceptions to these exclusions would be considered if adequate mitigation could be implemented. Seasonal limitations would also apply to these activities, further affecting exploration operations but not precluding them.

Applicants would have less opportunity to locate and route ROWs under this alternative than under the No Action Alternative. Placement of ROWs would be limited in areas with sensitive or unique resources through employment of seasonal limitations and by an increase in areas designated as VRM Class II (Map 47). Construction would be subject to VRM classifications and seasonal limitations in approximately half of the planning area, which could affect the amount of time needed to place utilities in ROWs. This could

adversely affect users through increased project costs. An impact would be significant if a project were abandoned because the expected costs outweighed the benefits of acquiring the ROW. However, exceptions might be granted which would lessen this effect (Appendix 4).

The level of mineral development would be slightly less under this alternative than under the No Action Alternative, thereby decreasing benefits to access and travel. Decreased development of existing and new leases would result in forgone opportunities to develop additional access routes. However, decreased oil and gas development could reduce the health and safety risks to OHV users associated with exposed pipelines in areas of shifting sand.

Restrictions on surface use and surface occupancy imposed by VRM classifications would be more restrictive than under the No Action Alternative through designation of additional Class I and II areas (Table 4-1 and Map 47). This would increase related impacts on OHV use, travel within the planning area, ROW developments, and other realty actions.

4.6.1.6 Proposed JMH CAP

For the area of travel, access, and realty, the management actions associated with the Proposed JMH CAP would primarily affect where and when access to and travel within the JMH CAP planning area would be allowed, and where ROWs and other realty actions would be permitted. The limitations placed on travel, access, and realty management and related users would depend on the locations of sensitive resources and the measures used to protect those resources.

Management of water, vegetation, and wildlife resources would place restrictions on access, travel, and realty actions within the planning area, thereby impacting related users. Such restrictions could affect OHV use, general travel within the planning area, access to remote locations, ROW developments, land exchanges, and other realty actions. Management actions designed to protect water, vegetation, and wildlife resources would include limitations on surface disturbing and disruptive activities (including OHV use) in the form of designated avoidance areas, surface use stipulations, and specific mitigation measures. The area within 500 feet of wetlands and riparian areas, areas containing highly erodible soils, potential habitat for and known locations of special status species, and other sensitive wildlife habitat would all be subject to surface disturbance restrictions, which would place limitations on access to and use within the planning area. Management actions for greater sage-grouse habitat would be more restrictive than under the No Action Alternative, potentially increasing impacts on access, travel, and realty management. Impacts are not expected to be significant because many of the restrictions designed to protect land and water resources would be implemented on a seasonal basis. In addition, ROW windows have been identified in the Green River RMP for areas outside the JMH CAP planning that provide opportunities for placement of major transmission facilities.

Land adjustments and exchanges identified in the Green River RMP would be pursued, including exchange of state lands within WSAs and other special management areas. Acquiring state inholdings and other lands would likely result in beneficial impacts on travel, access, and realty management because BLM could implement cohesive management practices and reduce fragmentation of the planning area. Similar benefits could occur to the state or private party receiving lands in the exchange. Certain lands (e.g., areas with wetland and riparian habitat) would not be considered for disposal unless exchanged for lands of equal or better value (including functional resource value and monetary value).

Transportation planning would provide for appropriate access routes to provide maximum protection for crucial habitats and sensitive resources. Unlike the No Action Alternative, the Proposed JMH CAP would implement a transportation plan that could include mitigation measures (such as offsite placement of facilities, remote control monitoring, restricted or prohibited surface use, and concentration of pipelines

and power lines) in areas subject to seasonal limitations and controlled surface use and NSO stipulations. This could limit access to and use within the planning area and could have significant adverse impacts on users if areas were no longer accessible by vehicles and travel time increased because more direct routes were not available. Moreover, travel management plans would be developed in conjunction with transportation planning efforts to control development within Steamboat Mountain, White Mountain, the two northern calving areas, and Essex Mountain. This could adversely affect users if access distance became too lengthy or costly, or was eliminated entirely, which could effectively preclude development. Implementing OHV use designations and related seasonal closures would impact users by limiting travel within the planning area. However, impacts would likely be minimal because existing and designated roads and trails would provide adequate vehicle access throughout the planning area. Geophysical activities would be allowed throughout the planning area, subject to appropriate mitigation and limitations applied to ROWs (Map 49) and measures to protect sensitive resources. Activities would not be allowed within one-half mile of the Pinnacles Geologic Feature or in areas of sensitive heritage resources and geologic features, such as Boars Tusk, White Mountain Petroglyphs, and historic trails. In addition, geophysical vehicles would not be allowed in areas closed to OHV use. Geophysical activities would be allowed in sensitive resource areas only if they could be performed with acceptable mitigation of impacts. Such restrictions would likely limit geophysical activities and thereby adversely impact users. However, exceptions to these limitations would be considered. To the extent possible, utility and transportation ROWs would be located to coincide with existing roads, trails, and other ROWs or easement concentration areas, where they would not create safety hazards or conflict with other resources and uses. Placement of ROWs would also be limited in exclusion and avoidance areas (Map 49). This could affect specific placement of ROWs and access to future development locations. Specific impacts could include logistical difficulties in using an existing road, trail, other ROW, and/or easement because of unfavorable geography, proximity, or presence of sensitive resources. The level of impact would depend on the location of existing roads, trails, other ROWs, and/or easements relative to the location objective of the user. Mitigation measures to alleviate this problem would include coordination of proposed leases with the overall transportation plan and individual travel management plans as applicable.

Mineral development activities would generally benefit travel and access within the planning area through the development of additional roads needed to access drilling locations. This would increase the level of access and travel opportunities within the planning area. However, mineral development activities could also create health and safety risks to OHV users if pipelines became exposed in areas of shifting sand, which could have a significant adverse impact on users. These impacts could be reduced in Area 3 (Figure A17-1) of the JMH CAP fluid mineral leasing implementation strategy (Appendix 17). The majority of Area 3 would be closed to new oil and gas leasing, which would result in less well development and associated road construction. Over the long term, impacts in Area 3 would be minimized because all leases in this area would expire within an 11-year time period.

Visual resources management would adversely impact travel, access, and realty management by imposing restrictions on surface use and surface occupancy via VRM classifications, which serve to retain the existing character of the landscape. These restrictions could affect OHV use, general travel within the planning area, ROW developments, and other realty actions. Specifically, restrictions related to VRM classifications could increase project costs related to ROW developments and geophysical activities. An impact would be significant if a project were abandoned because expected costs outweighed the projected benefits. Although VRM classifications would differ slightly under this alternative compared with the No Action Alternative, the level of impact would be similar given that increases in VRM Class II areas would help offset increases in VRM Class IV areas under this alternative.

4.7 RECREATION RESOURCES

BLM-administered lands are managed to provide broad opportunities for many different types of recreation use. This resource management category includes dispersed recreation use and hunting.

4.7.1 Potential Impacts on Recreation Resources

The land use program for recreation resources has environmental impacts on resources and nonenvironmental effects (e.g., quality of recreation experience) on resource users. Impacts on resources and resource users resulting from implementation of recreation management actions are discussed in those particular resource sections. This section describes potential impacts on recreation resources or opportunities resulting from the implementation of management actions for other resource management categories.

An impact on recreation resources would be significant if an activity resulted in elimination of recreation use in any area, affected the user's experience, or would compromise public health and safety. Significant impacts would also occur if a level of development occurred that would prevent meeting the recreation objectives for the planning area or if activities occurred that would have a direct or indirect effect on wilderness suitability.

For analysis purposes, it is assumed that recreation activity levels would vary by alternative and would be related to how much recreation opportunity would be created or lost because of other projected development and activities. The specific assumptions for activity levels are presented in Section 4.12, Socioeconomics. Generally, dispersed recreation use is assumed to increase under each alternative, whereas OHV use is assumed to remain constant or to increase for a few years and then remain constant or decline slightly. New large-scale recreation facilities or developments would not be constructed during the planning period. Existing recreation facilities might be upgraded or improved. Hunting for elk is assumed to remain constant for all alternatives except Alternatives 1 and 2, for which the number of hunting days is expected to increase slightly in early years (because of dispersion of animals and decreased access) and to begin to decline in the later part of the planning period. Other big game hunting would remain constant. Greater sage grouse hunting is expected to decline under the No Action Alternative and Alternatives 1 and 3, as populations continued to decline, and to remain constant under Alternative 2 and the Proposed JMH CAP.

4.7.1.1 Common to All Alternatives

For recreation resources, the management actions associated with the alternatives would primarily affect where and when recreation use would be permitted within the planning area. The limitations placed on users of the planning area would depend on the location of sensitive resources and the measures used to protect these resources.

Management of land and water resources would not have significant impacts on recreation resources. These management actions generally limit the extent of surface disturbing activities or vegetation removal and provide for protection of habitat used by wildlife, which indirectly benefits the recreation user. Limitations on seasonal use of the planning area to protect sensitive plant and wildlife habitat would limit recreation use during certain times of the year; however, impacts on recreation users would not be significant because of the temporary nature of these limitations.

Heritage sites such as White Mountain Petroglyphs, National Historic and National Scenic Trails, Boars Tusk, Crookston Ranch, and Tri-Territory Marker contribute to the recreation resources of the planning area. Managing and protecting these heritage resources would directly benefit the resources and users of

these resources. Protection of these resources, in addition to the development of interpretive sites for select areas, would enhance the recreation experience in the planning area.

4.7.1.2 No Action Alternative

Salt or mineral supplements for livestock would not be allowed within 500 feet of riparian habitat or National Historic and Scenic Trails. This would have a beneficial effect on recreation users by protecting riparian areas used for camping and fishing and by maintaining the cultural integrity of the trails.

The actions proposed for the management of wildlife would have impacts on recreation use because of the seasonal restrictions placed on OHV use within the greater sage-grouse nesting areas. However, impacts on recreation users would not be significant because of the temporary nature of these limitations.

The actions proposed for managing recreation resources would have beneficial impacts on both the resource and the user. The proposed development of recreation project and site plans and interpretive signs for the backcountry byways, historical sites, and viewing areas would represent a positive effect for the recreation experience and could increase the number of recreation visitor days for certain dispersed activities. Limitations on dispersed camping to protect riparian areas and protection measures associated with special recreation use permits would not significantly affect these uses.

Existing roads and trails provide adequate vehicle access in the planning area for recreation purposes. OHV designations would minimize adverse impacts on recreation resources by limiting disturbance to vegetation, watersheds, and wildlife; however, this could also impact OHV users through limitations on access and use within the planning area. Approximately 20 percent of the planning area would remain closed to OHV use. A recreation project plan would be developed to expand the parking area and facilities at the Greater Sand Dunes Recreation Area (i.e., OHV open area) to accommodate anticipated increases in OHV users and reduce user conflicts, thereby enhancing the recreation experience.

The construction of facilities and ROWs for pipelines, transmission lines, communication lines and towers, and oil and gas development could adversely affect recreation resources. Land clearing, grading, construction, and drilling activities would create dust, noise, and increased traffic. These activities could have adverse impacts on recreation uses because the activities would be visually and audibly apparent during the recreation experience. The significance of any impact for recreation users would depend on the proximity to the development. Users could be inconvenienced if ROW construction impeded access to recreation activities; however, any impact would likely not be significant because of the temporary nature of the construction. The visual intrusion of these developments would be site-specific and would not affect recreationists outside the viewshed of each facility.

The oil shale and coal classification would be revoked, and upon revocation, the planning area, with the exception of White Mountain Petroglyphs, Greater Sand Dunes ACEC, special status plant sites, Crookston Ranch, public water reserves, Tri-Territory Marker, and South Pass Summit, would be open for mineral location, having a beneficial effect on recreation users because additional locations would be available for recreational mining activities.

VRM classifications provide the planning mechanism for maintaining or improving scenic quality by managing the effects of human activities and other intrusions on the visual landscape. Implementation of these classifications would have beneficial effects on recreation resources and users by ensuring that surface disturbing activities would be compatible with the existing character of the landscape and that visual intrusions would not adversely affect the recreation experience. The existing landscape of recreation resources, including WSAs, 1-mile transition zones around WSAs, and ACECs, would be maintained or retained, thus having a beneficial impact on the recreation use of these areas.

Management prescriptions associated with special management areas, including ACECs, WSAs, and National Historic or Scenic Trails, would provide protection to recreation resources by limiting or controlling surface disturbing activities and development in these areas. This would have a beneficial impact on recreation users by minimizing incompatible uses in these areas and providing areas for solitude and primitive recreation opportunities.

4.7.1.3 Alternative 1

Salt or mineral supplements for livestock would not be allowed within 250 feet of riparian habitat and National Historic and Scenic Trails. This could have an adverse effect if areas frequented by recreationists for camping, fishing, and hiking were altered so as to impact the recreation experience.

The actions proposed for the management of wildlife within the greater sage-grouse nesting area would be less restrictive on recreation than those under the No Action Alternative. This is because the area under consideration is less extensive and because only areas under consideration that contain sagebrush would have restrictions on OHV use.

Like the actions under the No Action Alternative, the actions proposed for managing recreation resources under this alternative would have beneficial impacts on both the resource and the user. The proposed development of recreation project and site plans and interpretive signs for backcountry byways, historical sites, and viewing areas would represent a positive effect for the recreation experience and could increase the number of recreation visitor days for certain dispersed activities. However, potential conflicts between increased development activities and recreation uses in certain areas could have a long-term effect if recreation resources or the recreation experience were degraded such that visitor days declined. Limitations and requirements for dispersed camping and special recreation use permits would not significantly affect these uses.

Anticipated development would likely create additional access routes in the planning area that could be used by recreationists. The OHV designations would be less restrictive than those under the No Action Alternative because OHV use would be limited to designated roads and trails, or be subject to seasonal access limitations, in fewer areas. This could have adverse effects on users who preferred nonmotorized forms of recreation.

Leaseholders and applicants for ROWs would have greater flexibility in and opportunity for oil and gas development and location and routing of ROWs in the planning area than they would under the No Action Alternative. Construction and drilling activities would create more dust, noise, and traffic, which could have adverse impacts on recreation uses, than under the No Action Alternative. However, the significance of any impact on recreation resource users would depend on the proximity of the recreation activity to the development. There could be adverse impacts on recreation users if ROW construction impeded access to recreation activities, but any impact would be temporary and insignificant. Recreation users could be adversely affected by increased developments and surface disturbing activities' affecting the visual appeal of the area. The significance of any impact would be site-specific and would vary among recreationists because of the subjective nature of visual appeal and its influence on a recreation experience.

The development of roads and well facilities would result in more access to the planning area and potential loss and fragmentation of wildlife habitat, which could increase hunting pressure on wildlife. Projected increases in human activity from all types of users (i.e., industry workers, hunters, recreationists) could cause displacement of wildlife populations that support recreation activities such as hunting and wildlife viewing. The significance of any impact on recreation resources and resource users would depend on the extent to which recreation opportunity was reduced.

Although most of the planning area would be open to mineral location, areas of notable recreation importance, including White Mountain Petroglyphs, Crookston Ranch, Tri-Territory Marker, and South Pass Summit, would be withdrawn from filing of mining claims, exploration, and development. This would have a beneficial effect on recreation users by preventing or limiting surface disturbing activities associated with mining activities in these particular areas and by leaving the remainder of the planning area available for recreational mining use activities.

The VRM Class II classification would provide protection to recreation resources by limiting or controlling surface disturbing activities and development in the designated areas. This would benefit users by minimizing incompatible uses in these areas and providing areas for solitude and primitive recreation opportunities. However, the overall extent of beneficial impacts would be less extensive than under the No Action Alternative because there would be more land area designated as VRM Class IV, which could degrade the recreation experience.

The benefits of special management areas for recreation resources would be reduced under this alternative compared with the No Action Alternative, with the removal of the ACEC designation from Steamboat Mountain.

4.7.1.4 Alternative 2

Salt or mineral supplements for livestock would not be allowed within one-half mile of riparian habitat and National Historic and Scenic Trails. This would have a greater beneficial effect on recreation resources and users than would the corresponding provisions of the other alternatives, by ensuring protection of riparian areas used for camping and fishing and by maintaining the cultural integrity of the trails.

The proposed actions for the management of wildlife under this alternative would have greater impacts on recreation use than would those under the No Action Alternative and Alternative 1. The closure of more than 70 percent of the planning area to OHV use would create direct impacts by precluding access to these areas, as well as indirect impacts by directing heavier use to other locations within the planning area. At the same time, these restrictions would have a beneficial impact on other recreation users by minimizing incompatible uses in these areas and providing areas for solitude and primitive recreation opportunities.

Recreation resources and resource users would be expected to benefit from increased recreation planning. Recreation project and site plans and interpretive signs for backcountry byways, historical sites, and numerous viewing areas under this alternative would have greater beneficial effects on the recreation experience than would those under the No Action Alternative and Alternative 1 because plans would be prepared and implemented instead of developed on an as-needed basis as under the No Action Alternative and Alternative 1. Camping would be limited to designated areas, and activities and locations would be monitored through a permit program for parties of five or more to ensure that adverse impacts on other resources values would not occur. Special recreation use permits for managed activities proposed for the planning area would be reviewed and issued by the Rock Springs Field Office to monitor this type of activity and any potential impact on resources from such use. This could inconvenience outfitters and discourage some recreationists from camping in JMH but is not expected to have significant impacts on camping activities.

The projected decrease in the level of mineral development activities, along with limitations on ROWs, would reduce impacts on recreation resources and certain recreation users compared with the other alternatives. Potential overlapping resource uses would be minimized, and the overall recreation experience would likely be enhanced because of preservation of sensitive resources that attracts

recreationists to the planning area. Construction and drilling activities would create dust, noise, and increased traffic, but not to the extent that they would under the No Action Alternative or Alternative 1; thus, any adverse impacts on recreation uses due to visual or audible disturbances to the recreation experience would not be significant.

Although additional access roads and well facilities would be constructed, this alternative would provide the lowest level of access to the planning area because of OHV use limitations. This could have an adverse impact on some hunters, because many hunting areas would be inaccessible except by nonmotorized means.

The entire planning area would be withdrawn from mineral location. This would have an adverse effect on recreational mining activities because no areas would be available for this type of use. Other recreation users would benefit from this action.

Management of visual resources under this alternative would provide protection to recreation resources by limiting or controlling surface disturbing activities and development in areas with sensitive visual resources. This would have a beneficial impact on recreation users by minimizing incompatible uses. Beneficial impacts would be greatest under this alternative because of increased designations of more restrictive VRM classifications.

Management prescriptions associated with additions and expansions of ACECs would benefit recreation resources by providing an increase in areas with opportunities for solitude and primitive recreation.

4.7.1.5 Alternative 3

Salt or mineral supplements for livestock would not be allowed within one-quarter mile of riparian habitat and National Historic and Scenic Trails. This would have a greater beneficial effect on recreation resources and users than would corresponding provisions under the No Action Alternative by ensuring protection of riparian areas used for camping and fishing and by maintaining the cultural integrity of the trails.

Approximately 30 percent of the planning area would be closed to OHV use. This could have adverse effects on users who preferred motorized forms of recreation, similar to the effects under the No Action Alternative.

Increased recreation planning would benefit recreation resources and resource users as described in Alternative 2. Camping would be limited to designated areas, and activities and locations would be monitored through a permit program for parties of 10 or more to minimize potential adverse impacts on other resource values. As under Alternative 2, special recreation use permits for managed activities proposed for the planning area would be reviewed and issued by the Rock Springs Field Office to monitor this type of activity and any potential impact on resources from such use. This could inconvenience outfitters and discourage some recreationists from camping in JMH but is not expected to have significant impacts on camping activities.

The projected decrease in the level of mineral development activities and limitations on ROWs compared with the No Action Alternative would likely reduce impacts on recreation resources and certain recreation users. The overall recreation experience in the JMH CAP planning area would likely be enhanced because of protection of sensitive resources that would attract recreationists to the area. Potential adverse impacts caused by visual or audible disturbances to the recreation experience could occur from construction and drilling activities but are not likely to be significant because of the temporary nature of these activities. Although mineral development facilities would constitute a long-term visual intrusion on

the landscape that could affect recreation resource users, impacts would be site-specific and not likely to affect recreationists outside the viewshed of each facility.

Although most of the planning area would be open to mineral location, areas of notable recreation importance, including White Mountain Petroglyphs ACEC, Crookston Ranch, Tri-Territory Marker, Boars Tusk, and South Pass Summit, would be withdrawn from filing of mining claims, exploration, and development, as they would under the No Action Alternative. The lava rock portion of Steamboat Mountain and the northern area used for elk calving would also be withdrawn from mineral location. Recreational mining activity would be limited to a 5-acre site that would be designated in the Dickie Springs-Oregon Gulch Gold Placer Mining District area. A recreation site plan would be prepared and implemented to manage the site for recreation purposes. This would have a beneficial effect on other recreational users by preventing or limiting surface disturbing activities associated with mining activities in these particular areas.

VRM classifications would provide protection to recreation resources by limiting or controlling surface disturbing activities and development in areas of sensitive visual resources. This would have a beneficial impact on recreation users by minimizing incompatible uses in these areas. Beneficial impacts would be greater than under the No Action Alternative because of increased designations of more restrictive VRM classifications.

Management prescriptions associated with additions and expansions of ACECs would significantly benefit recreation resources by providing an increase in areas with opportunities for solitude and primitive recreation.

4.7.1.6 Proposed JMH CAP

For recreation resources, the management actions associated with this alternative primarily would affect where and when recreation use would be permitted within the planning area. The limitations placed on users of the planning area would depend on the location of sensitive resources and the measures used to protect these resources.

The management of land and water resources would not have significant impacts on recreation resources. Management actions generally limit the extent of surface disturbing activities or vegetation removal and provide for protection of wildlife habitat, which indirectly benefits the recreation user. Limitations on seasonal use of the planning area to protect sensitive plant and wildlife habitat would limit recreational use during certain times of the year; however, impacts on recreation users would not be significant because of the temporary nature of these limitations.

Salt or mineral supplements for livestock would not be allowed within 500 feet of riparian habitat and National Historic and Scenic Trails. This would have a beneficial effect on recreation resources, although less than would occur under Alternatives 2 and 3, by ensuring protection of riparian areas used for camping and fishing and by maintaining the cultural integrity of the trails.

Heritage sites such as White Mountain Petroglyphs, National Historic and National Scenic Trails, Boars Tusk, Crookston Ranch, and Tri-Territory Marker contribute to the recreation resources of the planning area. Managing and protecting these heritage resources would directly benefit the resources and users of these resources. Protection of these resources, in addition to the development of interpretive sites for selected areas, would enhance the recreation experience in the planning area.

This alternative would provide fewer opportunities than that of the No Action Alternative to develop the planning area. This would curtail surface disturbance and construction of facilities, which would likely benefit recreation opportunities in the planning area.

Increased recreation planning would benefit recreation opportunities in the planning area, as described in Alternative 2. Dispersed camping would be allowed under the Proposed JMH CAP as long as these activities would not cause damage to other resources. Special recreation use permits for activities proposed for the planning area would be reviewed by the Rock Springs Field Office to monitor this type of activity and any potential impact on resources from such use. This could inconvenience outfitters but would not be expected to deter recreation activities; thus any impact on users would be negligible.

Existing roads and trails provide adequate vehicle access in the planning area for recreation purposes. OHV designations would minimize adverse impacts on recreation resources by limiting disturbance to vegetation, watersheds, and wildlife; however, this could also impact OHV users through limitations on access and use within the planning area. Approximately 20 percent of the planning area would be closed to OHV use. A recreation plan would be developed to expand the parking area and facilities at the Greater Sand Dunes Recreation Area (i.e., OHV open area) to accommodate anticipated increases in OHV users, thereby enhancing the recreation experience.

As under Alternative 3, the projected decrease in the level of mineral development activities and limitations on ROWs under this alternative would slightly reduce impacts on recreation opportunities and certain recreation users compared with the No Action Alternative and Alternative 1. The overall recreation experience in the planning area would likely be enhanced because of protection of sensitive resources that would attract recreationists to the area. Potential adverse impacts caused by visual or audible disturbances to the recreation experience could result from construction and drilling activities but are not likely to be significant because of the temporary nature of these activities. Although mineral development facilities would constitute a long-term visual intrusion on the landscape that could affect recreation resource users, any impact would be site-specific and not likely to affect recreationists outside the viewshed of each facility.

Although the level of projected development would be the same as that under Alternative 3 (Table A13-7), the strategy for implementing fluid mineral leasing decisions (Appendix 17) might affect the degree of impact in certain areas. There would be no new oil and gas leasing in the majority of Area 3 (Figure A17-1), which could reduce impacts in this area over the long term. However, in the short term, this could result in more rapid exploration and development of existing leases in Area 3 because there would not be any opportunity to renew leases upon expiration. Moreover, given that much of this area is within the high development potential area (Map 69), successful well completion rates are expected to be high. These factors could result in a substantial increase in surface disturbance, noise, and visual intrusion over a relatively short period of time, potentially increasing short-term impacts on the recreation experience compared with Alternative 3.

Although most of the planning area would be open to mineral location, areas of notable recreation importance, including White Mountain Petroglyphs, Crookston Ranch, Tri-Territory Marker, and South Pass Summit, would be withdrawn from filing of mining claims, exploration, and development, as they would under the No Action Alternative. A portion of Steamboat Mountain and the northern birthing areas would also be withdrawn from mineral location. This would have a beneficial effect on recreation users by preventing or limiting surface disturbing activities associated with mining activities in these particular areas. Recreational mining activity would be allowed in those parts of the planning area that were not withdrawn from mineral location or where such withdrawals would not be pursued. Mineral sales would not be allowed within the greater sage-grouse nesting habitat.

Management of visual resources would provide protection to recreation resources by limiting or controlling surface disturbing activities and development in sensitive visual resource areas. This would have a beneficial impact on recreation users by mitigating incompatible uses in these areas. Impacts would be slightly greater than under the No Action Alternative because of increased designations of more restrictive VRM classifications.

Management prescriptions associated with additions of special management areas under this alternative would benefit the recreation resources increasing the area available for solitude and primitive recreation opportunities.

4.8 MINERALS AND ALTERNATIVE ENERGY RESOURCES

Minerals and alternative energy resources include fluid and solid minerals leased for development under the Mineral Leasing Act of 1920 and amendments, locatable minerals that may be claimed and patented under the Mining Act of 1947, earth materials that may be purchased under the Mineral Materials Sales Act of 1947, and alternative energy development projects that may be proposed within the planning area through a lease or permit arrangement with BLM. Where there is state or private ownership of the mineral estate, BLM does not have jurisdiction over the development of those mineral rights.

Impacts on resources and resource users resulting from implementation of mineral management actions are discussed in those particular resource sections. This section describes potential impacts that implementation of management actions for other resource management categories might have on mineral development and the development activity expected for each mineral resource under each alternative. These activity level projections also provide the basis for assessing impacts on the environment and other resource uses.

Impacts on mineral development would be considered significant if management actions or mitigation requirements resulted in a greater than 25 percent decrease in development activity over the planning period or caused development of the resource to be infeasible or economically nonviable.

4.8.1 Potential Impacts on Leasable Fluid Minerals

Impacts of management actions on resource development activities occur when management actions prohibit development of economically viable resources or when management actions render development infeasible or economically nonviable. The relative impacts of management actions are identified by projecting changes in development activity within the planning area for the different alternatives. A management action can impact the individual resource user, such as a lease operator, when it results in a projected change in development activity. The significance of the impact depends on the resulting change in overall development levels, which would depend on the amount of production affected by the action. Exploration and production activity within the JMH planning area would also be affected by factors other than management actions, such as commodity prices.

The effects discussed in the analysis are based on the estimated levels of development activity for the management actions that would be implemented under each alternative (Appendix 13). Land use planning decisions and mitigation requirements included in each alternative are also considered. Generally, a 20-year period, with the base year as 2001, was used in preparing assumptions for each resource. It is also assumed that BLM actions and land uses under each alternative would be required to comply with existing laws, regulations, guidelines, and standards for multiple use of public lands. The comparison of management alternatives assumes that increased resource mitigation generally results in increased costs for activities. It is assumed that prescribed mitigation measures through lease stipulations

would be successful and adjusted over time to meet resource objectives. The assumption and analysis guidelines discussed above were used to assess impacts under all of the alternatives.

Leasable fluid minerals include oil, natural gas, and coalbed gas. The analysis of impacts for fluid minerals is based on the following assumptions.

Oil and Gas. It is assumed that all existing leases within the JMH CAP planning area would see some development over the 20-year planning period and that development activities would be concentrated in the high development potential area.

Under the Proposed JMH CAP, it is assumed that wells on existing leases in Area 3 would be drilled during the first 11 years of the planning period (8 year maximum lease term plus 3-year suspension release). Unleased portions of Areas 1 and 2 would be leased and once leases expired, it is assumed they would be available to be released.

The Wyoming Oil and Gas Conservation Commission has established a density of 160 acres per gas well, with federal exploratory units exempt from that density requirement. Nitchie Gulch unit/field is now developed at a density of 160 acres per well. Up to 38 new production wells would be drilled in Nitchie Gulch, with a maximum well density of up to six wells per section. This development is expected to occur over the first 5 years of the planning period. Other producing units in the planning area (Buccaneer, Rim Rock, and Steamboat Mountain units) are developed at a density of 640 acres per well. Future exploratory activity would be widely spaced; however, development activity would most likely occur at a density of 160 acres per well.

Ultimate gas recovery from existing gas wells is estimated to be 145.4 billion cubic feet. Approximately 24.3 billion cubic feet of gas is left to produce from these active wells. Based on the production history of wells in the planning area, the average estimated ultimate gas recovery is expected to be 2.3 billion cubic feet per well. Decline curve analysis indicates that the average well would produce about 2.3 billion cubic feet of gas over a lifespan of 26 years before declining to an uneconomic rate, which would then result in abandonment.

The ratio of gas to oil (condensate) production is assumed to remain similar to its present ratio. At this ratio an average well would produce only 117 barrels of oil each year. Because of the relatively low production rates of oil, these resources are not evaluated in the total production estimates for the planning area.

To avoid drainage from state and/or private fluid mineral development, adjacent 160-acre spacing areas could be accessed by directional drilling (probably from state or private surface locations). It is also assumed that because there is a small amount of state and/or private mineral land within the planning area, only a minimal amount of drainage would be likely to occur.

Surface Disturbance. The following disturbance rates are assumed for access roads, drill pads, and pipelines and power lines associated with oil and gas exploration and development drilling activities. The amount of surface disturbance per well is based on standard industry practices and compliance requirements of existing regulations for surface disturbing activities.

Access Roads:

- 40 feet total width
- 12- to 14-foot-wide travelway
- 4.8 acres initial disturbance per linear road mile

- 1.5 miles of road construction for exploration wells
- 0.375 miles of road construction for development wells
- 4.0 acres long-term disturbance per producing well (no stabilization or revegetation of barrow ditch)
- 4.0 acres of access road stabilized per abandoned dry well, after 3 years
- 4.0 acres of access road stabilized after abandonment of each producing well, after 3 years
- Road standards would be in conformance with guidelines issued in BLM Manual 9113 (Roads) and Surface Operating Standards for Oil and Gas Exploration and Development (1989).

Drill Pads:

- 3.0 acres initial disturbance per average well pad
- 0.7 acres long-term disturbance per producing well
- 2.3 acres stabilized per producing well, after 3 years
- 3.0 acres stabilized per abandoned dry well, after 3 years
- 0.7 acres stabilized after abandonment of each producing well, after 3 years.

Pipelines and Power Lines:

- 6.0 acres initial disturbance per producing well
- 5.5 acres stabilized per producing well, after 3 years
- 0.5 acres long-term disturbance per producing well
- 0.5 acres stabilized after abandonment of each producing well, after 3 years.

Drilling of wells would require water to make up drilling fluid and for consumption in various processes, such as washing down equipment and for fire fighting reserve water. In general, oil and gas wells drilled in the depth ranges expected in the planning area require 1 to 1.5 acre-feet of water. Coalbed gas wells drilled to depths of greater than 1,200 feet would require 0.75 to 1 acre-foot of water consumption.

Coalbed Gas. Currently, there is no active coalbed gas production in the planning area because of low gas production rates on initial well tests and water disposal costs. No coalbed wells are expected to be drilled until after the signing of the record of decision (ROD). Each project would contain up to 25 wells, 9 interior wells and 16 surrounding wells, to adequately evaluate an area. Drilling fewer than 16 surrounding wells might not reduce hydrostatic pressure to the point that an adequate test of potential to recover coal gas from the interior wells could be made. If successful, all 25 wells could eventually produce gas. No production rate assumptions were made for coalbed gas, and no production history is available on which to base a reasonable assessment at this time. Coalbed gas wells produce at relatively low rates, and the projected producing wells would not contribute significant production to the much larger volumes expected from conventional wells.

The surface disturbance rates associated with drilling oil and gas wells are similar to surface disturbance at coalbed gas wells for access roads, drill pads, and pipelines and power lines.

Expected water production rates associated with coalbed gas cannot be predicted for the planning area. Produced water from shallow-depth coal seams should contain lower concentrations of dissolved solids. However, most of the planning area is subject to strict water quality discharge requirements to comply with state and federal regulations on salinity control. Because the area with high coalbed gas potential is located within the Colorado River Basin, these requirements are assumed to apply to all coalbed gas development projects that may occur in the planning area. All produced water would be reinjected into the subsurface in compliance with water quality regulations. Existing gas wells in the planning area could be converted to injection wells at the end of their productive life.

4.8.1.1 Common to All Alternatives

The management alternatives include restrictions on fluid mineral resource development as a result of conflicts with environmentally related surface values. These restrictions result in impacts on the use of the resources while providing additional protection of the environment. Actions such as not leasing portions of the planning area, application of NSO restrictions, controlled surface use mitigation, seasonal restrictions, reclamation requirements, and ROW placement restrictions would affect the amount of exploration and development that would occur. These measures could discourage industry from initiating exploration and development activities and increase operating costs of development activities and transporting of products. Areas affected by restrictions or prohibitions on mineral development are listed in Tables 4-3 through 4-8 at the end of this chapter.

Where incremental costs resulted in a reduced return on investment below an acceptable minimum, the leaseholder could choose not to proceed with the development. The decision not to proceed with development would result in a reduced production of oil and gas, lower royalty and tax payments, and decreased spending with contractors and vendors, such as drilling and service companies. In some cases, a lease- or claimholder might recoup some or all of the expenditures for a right by selling his or her interest to another operator if there were a willing buyer. Exercise of mitigation measures could result in nonenvironmental impacts on resource users, including decreased profit and reduced interest in developing other economically marginal resources within the planning area.

Incremental compliance costs and related considerations less frequently make development of a commodity economically nonviable if the commodity is relatively high valued to begin with. Higher valued commodities, such as oil and gas, can bear some cost increases and still be profitable because of the value and scarcity of the material produced. In general, development of lower-value commodities, such as sand and gravel, are more sensitive to additional costs of compliance. As a result, for these commodities, alternate sources with lower compliance costs would likely be developed first. Because the costs would depend on the specific actions required for land use activities (such as resource protection or avoidance requirements for a proposed oil and gas well location), these costs could only be quantified at the time of the site-specific analyses. The comparison of management alternatives assumes that increased resource mitigation generally results in increased costs for activities.

Resources in areas where energy and mineral development are prohibited because of nondiscretionary closures cannot be developed regardless of the market for the commodity or interest in development. No associated income or related economic activity could be realized from these resources, and the lost opportunity for development represents an unknown impact for resource users. Areas closed to development, or with cumulative restrictions that would prevent development, are considered in the impacts on resource users for each of the alternatives. The expected surface disturbance and vehicle traffic associated with oil and gas development are listed in Table A13-7 (in Appendix 13) and Table 4-12 (at the end of this chapter), respectively. These expected levels of surface disturbance and traffic volumes provide the basis for assessing potential impacts on other resources and are discussed in the respective sections for these resources.

4.8.1.2 No Action Alternative

Based on the existing management decisions for the planning area, the current understanding of the geologic potential of the available area, and the existing stipulations placed on leases, the projected level of development was estimated for the Hydrocarbon Occurrence and Development Potential Report (Appendix 13). Under the No Action Alternative, more than 210,000 acres would be closed (including about 119,000 acres of existing nondiscretionary closure) to new leasing (Map 10). More than 412,000 acres would be available for development through current or newly obtained leases (Map 10).

It is expected that 38 development wells would be drilled to infill locations at Nitchie Gulch unit/field, and existing leases could be explored and developed within the core area. The planning area outside the core area would be available for further leasing and development activity. Because more than 60 percent of the core area is currently leased, activity could occur on those leases at the completion of the planning process. However, a significant number of the leases would expire during the planning period unless the leases were developed and held by production. Because no new leases could be offered in the core area and expiring leases would become unavailable for further development, potential reductions in development activity would occur. Based on the predicted drilling and completion rates for the parts of the planning area that are currently leased or are open to leasing under the No Action Alternative, the total estimated drilling activity would be 221 wells drilled, with 114 wells placed in production. This would include 126 exploration wells and 95 development wells drilled in the planning area. Impacts on the resource users under the No Action Alternative would include the loss of opportunity to obtain new leases in the core area and incremental costs required to comply with stipulations on active and new leases, consistent with the resource protection requirements of the Green River RMP. Operators put together blocks of leases before exploration. Where leasing is restricted, opportunities to obtain control of blocks of leases would be reduced and consequently, exploration interest would be reduced. Because this alternative would result in a loss of development potential in the core area where there are no planning decisions to support leasing, it could have a significant impact on individual operators of oil and gas developments.

No coalbed gas project has currently proved to be economically viable in this portion of the Greater Green River Basin. Available geologic information indicates that there is potential for future coalbed gas development. Leasing and development could occur under the same requirements applicable to oil and gas leasing under the No Action Alternative, including compliance with existing regulations and lease stipulations.

Under the No Action Alternative, an initial phase of coalbed gas exploration would be expected to include up to 50 wells. This is based on the development of two exploration projects, each having 25 closely spaced wells to effectively dewater the coal and determine maximum gas production rates. This is the assumed level of activity for which economic viability could be estimated. At least small quantities of gas would probably be produced from any test, and successful completion of two exploratory projects could result in gas production rates of several hundred thousand cubic feet of gas per day.

If exploration tests showed that coalbed gas development would be economically feasible, well life could be 10 to 20 years based on information on coalbed gas wells in the Powder River Basin. Because no information is available to determine well productivity or success rates for the planning area, it was assumed that none of the 50 wells would be abandoned during the planning period. In addition to the 50 well sites, other facilities, such as access roads, gas gathering and water disposal pipelines, water injection wells, electrical utilities, and compressors, would be constructed to aid in production of any gas developed. If economically successful exploration projects for coalbed gas were completed in the planning area, the actual production rates and the acreage of areas available for coalbed gas development could be used to estimate production rates. Impacts under the No Action Alternative on coalbed gas development are the same as those for oil and gas leasing and development. No new leases could be offered in the core area, and expiring leases would become unavailable for further development. Developments would also be required to comply with applicable lease stipulations, which could result in additional costs to the developers. Because this alternative would result in a loss of development potential in the core area where there are no planning decisions to support leasing, it could have a significant impact on coalbed gas development if significant coalbed gas resources were present in the core area.

4.8.1.3 Alternative 1

More than 119,000 acres would remain closed to leasing (Map 20). Approximately 500,000 acres would be available for leasing and development under this alternative. The average number of wells in currently producing units within JMH is approximately four wells. Based on the average number of wells per producing unit and the area available for development, new discoveries would result in drilling of 70 development wells, and development drilling in existing producing areas would be expected to result in drilling of 38 additional infill producing wells, resulting in a total of 108 new development wells. The total estimated drilling activity is 264 wells drilled, with 132 wells placed in production. No additional restrictions based on lease stipulations would be placed on drilling and development activities beyond existing regulatory requirements, so no additional associated costs would be placed on development. There would be no loss of development activity based on increased costs associated with these types of requirements. No additional areas would be closed to oil and gas leasing and development, and expiring leases in the core area could be offered for subsequent development, resulting in an increase in development opportunities over the No Action Alternative. This would have a positive impact on oil and gas development and provide the greatest opportunities for development.

The planning area would be open to leasing and development except for areas closed to development through existing nondiscretionary closures. New oil and gas leases would be offered in the core area. Because high coalbed gas potential areas exist in the planning area, it is assumed that two exploration projects and 50 wells would still be installed under this management action, as under the No Action Alternative and Alternative 3. Impacts on coalbed gas development actions under Alternative 1 would include reduced costs compared with the No Action Alternative, because fewer resource protection stipulations would be required. This would have a positive impact on coalbed gas development and would provide the greatest opportunities for development.

4.8.1.4 Alternative 2

The management actions under Alternative 2 would result in no new leasing in sensitive resource areas and would provide compensation for existing rights to willing leaseholders in areas that would be closed to leasing for protection of sensitive resources (Map 31). More than 584,000 acres would be closed (including 119,000 acres of existing nondiscretionary closures) to oil and gas development, and nearly 38,000 acres would be available for lease offerings. If purchases or exchanges of existing leases were executed (Appendix 16), no new drilling and completion of production wells would occur on these leases in sensitive resource areas. In parts of the planning area without sensitive resources, leasing and development could occur, consistent with the planning requirements of the Green River RMP. Although any lease in a sensitive resource area could be exchanged or purchased, it is expected that drilling of additional development wells in currently producing areas would not be exchanged or bought out because of the relatively high probability of success for these wells. Operators put together blocks of leases prior to exploration. Where leasing is restricted, opportunities to obtain control of blocks of leases would be reduced and consequently, exploration interest would be reduced. Impact on exploratory activity under this alternative would increase compared with the No Action Alternative and Alternative 1. Based on the current estimates of areas that would not be available for leasing under this alternative, approximately 86 exploration wells would be drilled in the rest of the planning area at the projected density for exploration activity, resulting in 13 new producing wells. Development of the new discoveries would be expected to require drilling of 39 new producing wells, along with 38 infill wells drilled to expand existing production, resulting in 77 new development wells. A total 163 new wells would be drilled, with 90 new wells placed in production. This alternative would result in significant impacts on oil and gas development (26 percent reduction in wells compared with the No Action Alternative), with the greatest area closed to additional development of any alternative.

Areas closed to oil and gas leasing also would not be available for coalbed gas development. Because a large part of the planning area with potential for coalbed gas development contains sensitive resources, it is assumed that only one coalbed gas exploration project would be completed in the planning area, with up to 25 wells installed to dewater and test production in the exploration project. The impacts on coalbed gas development under this alternative include less area available for leasing and development compared with the No Action Alternative, and increased costs associated with resource protection requirements in lease stipulations compared with Alternative 1. This alternative would result in significant impacts on coalbed gas development, with the greatest area closed to additional development of any alternative.

4.8.1.5 Alternative 3

Alternative 3 provides for controls on leasing and levels of drilling activity to prevent irreversible adverse impacts on sensitive resources in the planning area. In addition, more than 128,000 acres would be closed (including 119,000 acres of existing nondiscretionary closures) to new leasing and development, with approximately 490,000 acres available for oil and gas development (Map 42). Past drilling activity shows that the highest 5-year rate was during the 1978–1982 period, when 48 wells were drilled. It is assumed that if drilling activity occurred at a level near the maximum rate observed for a 5-year period, a maximum rate of drilling activity could be projected. At a rate of 46 wells per 5-year period, an additional 205 wells could be drilled in the JMH planning area, including 115 exploration wells and a total of 69 development wells, with 107 new wells placed into production (Appendix 13).

Impacts on oil and gas development would increase under this alternative (compared with Alternative 1 and the No Action Alternative) because of resource protection requirements and restrictions on development activity, which would reduce development opportunities and increase compliance costs. Operators put together blocks of leases before exploration. Where leasing is restricted, opportunities to obtain control of blocks of leases would be reduced and consequently, exploration interest would be reduced. Exploratory impact would increase compared with the No Action Alternative and Alternative 1. The expected level of development under this alternative could represent a significant impact on development, with some loss of areas to development, and restrictions on the timing of development activity that might result in lost opportunities for economically viable development. However, this effect would depend on the trends of the sensitive resource indicators monitored as part of adaptive management.

The coalbed gas development activity estimates under this alternative are similar to those predicted for Alternative 1. Although the additional resource protection requirements that would be implemented under this alternative would increase development costs and might decrease interest in development of coalbed gas resources by industry, the initial two exploration projects and 50 wells anticipated for Alternative 1 could be carried out within the planning area. A high development potential area could be leased and explored outside of sensitive resource areas. Any reduction in development related to access restrictions and costs associated with mitigation requirements would probably affect later development activity, which cannot be estimated from currently available information because there is no development history for coalbed gas production in the planning area.

4.8.1.6 Proposed JMH CAP

The Proposed JMH CAP provides for development of existing leases and closes a portion of the planning area to leasing for protection of sensitive resources. Approximately 317,000 acres would be closed (including about 119,000 acres of existing nondiscretionary closure) to new leasing and development, with just over 305,000 acres available for oil and gas development (Map 54). As outlined in Chapter 2 and Appendix 17, the JMH CAP fluid mineral leasing implementation strategy is composed of three areas. Area 1 would be open to oil and gas leasing, exploration, and development, with appropriate

stipulations, mitigation, project planning, and design approach to meet JMH management objectives. Area 2 would be managed in the same way as Area 1, except that more stringent or intensive mitigation measures might be applied because of the amount of sensitive resource values. Area 3 would be closed to new leasing, and existing leases would not be renewed once they expired. A portion of Area 3 could be offered for lease with an NSO stipulation.

Lease suspensions would be lifted after 3 years from the signing of the ROD or on a case-by-case basis as requested by operators. This would allow industry time to submit proposals for development of those leases that were suspended with the Green River RMP ROD. Lease expiration dates are expected to be the driving factor for development of existing leases in Area 3 because of the inability to extend or renew leases. Those operators that hold multiple leases within Area 3 might not be provided with the opportunity to develop all of their leases because of the exploratory nature of development that would occur and the amount of capital if would take to provide drilling rigs for multiple lease areas. Small operators would be particularly affected by economic constraints. Because of the inability to extend or renew leases, exploration or drilling activity on existing leases within Area 3 is expected to occur in the first 11 years of the planning period, instead of over the 20-year life of the plan (because of the maximum 8-year lease period on existing leases within Area 3 and the 3-year reinstatement period for suspended leases).

A large portion of Area 3 is also within high development potential areas for oil and gas and coalbed gas resources. Although existing leaseholders would be given the opportunity to develop their leases, closing Area 3 to new leasing would affect resource users in ways similar to those under the No Action Alternative in the core area. Effects would include the loss of opportunity to obtain new leases in Area 3 and incremental costs required to comply with existing lease stipulations and COAs on active leases consistent with the resource protection requirements of the Proposed JMH CAP. The impacts on oil and gas development from this alternative include a net decrease in areas available for development compared with the No Action Alternative. The compliance costs associated with resource protection requirements would represent an increased impact on development compared with the No Action Alternative and Alternative 1.

Operators generally try to put together blocks of leases before exploration. They may also opt to unitize those lease blocks to assist in exploration. Where leasing is restricted, opportunities to obtain control of blocks of leases would be reduced and consequently, exploration interest would be reduced compared with the No Action Alternative and Alternatives 1 and 3. Because this alternative would result in a loss of development potential in Area 3, the inability to block up leases or to unitize lease blocks might represent a significant impact for individual operators of oil and gas developments.

Management actions, such as not leasing portions of the planning area, application of NSO stipulations, controlled surface use mitigation, seasonal restrictions, reclamation requirements, potential centralized and offsite placement of facilities, remote control monitoring, and ROW placement restrictions, being added for this alternative would affect the amount of exploration and development that would occur. These measures could discourage industry from initiating exploration and development activities and could increase operating costs related to development activities and transporting of products.

Past drilling activity shows that the highest 5-year rate was during the 1978–1982 period, when 48 wells were drilled. It is assumed that if drilling activity occurred at a level near the maximum rate observed for a 5-year period, a maximum rate of drilling activity could be projected. At a rate of 46 wells per 5-year period, an additional 205 wells could be drilled in the JMH planning area, including 115 exploration wells and a total of 69 development wells, with 107 new wells placed into production. The coalbed gas development activity estimates under this alternative are similar to those predicted for Alternative 1. Although the additional resource protection requirements that would be implemented under this

alternative would increase development costs and might decrease interest in development of coalbed gas resources by industry, the initial two exploration projects and 50 wells anticipated for Alternative 1 could be carried out within the planning area. Access restrictions and costs associated with mitigation requirements would probably adversely affect levels of later development activity, which cannot be estimated from currently available information because there is no development history for coalbed gas production in the planning area.

4.8.2 Potential Impacts on Leasable Solid Minerals

Potential leasable solid minerals in the planning area include coal, oil shale, sodium (brine), and potash. The analysis of impacts for solid minerals is based on the following assumptions.

No oil shale development is expected during the planning period. There is low potential for coal and brine development. Existing coal mines and known coal reserves south of the planning area are expected to meet the demand for coal (USDI 1996), but limited amounts of exploration could occur within the planning area to evaluate future coal development potential. If coal exploration occurred at all, it would likely occur in the last 5 to 10 years of the planning period. The most probable location for exploration would be within the Coal Occurrence and Development Potential Area (Map 56) and would be limited to the areas open to exploration south and east of the Steamboat Mountain ACEC and south of the eastern portion of the Greater Sand Dunes ACEC. Access would largely be overland and along existing roads and trails. The amount of disturbance is expected to be between 10 and 15 acres and to occur in a single season. It is expected that disturbed sites would be fully reclaimed within 3 years of disturbance.

Projected brine (containing soda ash, oil, and gas) development potential for the planning period is also low. Existing soda ash mines and oil and gas developments can more easily and economically meet the demand for these products. The existing soda ash mines are located outside the planning area.

The Leucite Hills, including Boars Tusk and Steamboat Mountain, are known to contain potash, but development of this resource within the planning area is unlikely during the planning period given existing surface use constraints, poor accessibility, high development costs, and better availability of potash from existing sources outside the planning area.

4.8.2.1 Common to All Alternatives

Leasing and mining of coal on BLM-administered lands requires evaluation of prospective lease areas by a 20-point suitability screening process. Areas identified as coal potential areas have been through this screening process and are considered available for leasing. Areas determined to be suitable for leasing could have additional restrictions placed on mining activity, such as NSO or subsurface mining with controls on the location of surface facilities.

4.8.2.2 No Action Alternative

Under the No Action Alternative, approximately 16,000 acres of the coal potential area would be closed to leasing. Another 17,980 acres of the coal potential area would be available for subsurface mining with controls on the location of surface facilities. Approximately 70 acres would be available for coal leasing with NSO requirements. If exploration activities in other parts of the planning area identified coal resources with economic potential, the area could be leased if it were determined to be suitable for development under the screening process. More than 270,000 acres of the planning area would be closed to coal exploration. Although coal resources in the planning area are generally less desirable for development than resources in other locations, there is some potential for coal development in the

planning area. Management actions affect the amount of land available for coal exploration, leasing, and mining, although these activities are not considered likely during the planning period.

Management actions under the No Action Alternative allow for consideration of leasing and development of potential potash and sodium resources. However, no development activity is expected in the JMH planning area during the planning period because of the lack of commercial deposits and/or because of existence of economic resources outside the planning area that are more favorable for development.

4.8.2.3 Alternative 1

The management actions under Alternative 1 close just under 5,000 acres in the coal potential area, with approximately 9,700 acres open to subsurface mining with controls on the location of surface facilities. More than 119,000 acres are closed to exploration activity because of special management areas and other resources protected by existing mitigation. No development activity is expected in the JMH planning area during the planning period because of the lack of commercial deposits and/or because of existence of economic resources outside the planning area that are more favorable for development. Therefore, although the closures to leasing and exploration represent a loss of opportunity to conduct these activities, impacts are not expected in development of these resources because development is not considered likely during the planning period.

4.8.2.4 Alternative 2

The management actions under Alternative 2 close the entire coal potential area to leasing, with more than 53,000 acres no longer available for leasing. The entire planning area (approximately 622,300 acres) would be closed to exploration activity. No development activity is expected in the JMH planning area during the planning period because of the lack of commercial deposits and/or because of existence of economic resources outside the planning area that are more favorable for development. Therefore, although the closures to leasing and exploration represent a loss of the opportunity to conduct these activities, impacts are not expected in development of these resources because development is not considered likely during the planning period.

4.8.2.5 Alternative 3

The management actions under Alternative 3 close approximately 16,000 acres in the coal potential area, with approximately 18,000 acres open to subsurface mining with controls on the location of surface facilities. Approximately 306,000 acres would be closed to exploration activity, as required for special management areas and other resources protected by existing regulations. The area available for leasing is similar to that under the No Action Alternative. No development activity is expected in the JMH planning area during the planning period because of the lack of commercial deposits and/or because of existence of economic resources outside the planning area that are more favorable for development. Therefore, although the closures to leasing and exploration represent a loss of the opportunity to conduct these activities, impacts are not expected in development of these resources because development is not considered likely during the planning period.

4.8.2.6 Proposed JMH CAP

The management actions under the Proposed JMH CAP close approximately 16,000 acres in the coal potential area, with approximately 20,600 acres open to subsurface mining with controls on the location of surface facilities. Approximately 320,000 acres would be closed to exploration activity, as required for special management areas and other resources protected by existing regulations. No development activity is expected in the JMH planning area during the planning period because of the lack of commercial

deposits and/or because of existence of economic resources outside the planning area that are more favorable for development. Therefore, although the closures to leasing and exploration represent a loss of the opportunity to conduct these activities, impacts are not expected in development of these resources because development is not considered likely during the planning period.

4.8.3 Potential Impacts on Locatable Minerals

Existing levels of mining claim activity from the gold placers in the Dickie Springs/Oregon Gulch area are expected to continue through the planning period. Exploration activity on these claims has typically disturbed 1 to 5 acres at a time and is related to trenching with a backhoe or manual tools. Such activity is limited to the snow-free months, typically May through mid-November.

The potential for development of a gold mine in this area is low. Existing information indicates that gold occurrences are limited to thin zones within the sand and gravel deposits that host the gold. Lateral continuity of these zones has not been established. The limited extent of potential gold occurrences is probably below total resource requirements needed to support a commercial operation. No mine proposals have been submitted. However, a hypothetical gold mine will be used to evaluate the impacts that would be associated with a commercial gold discovery. A hypothetical mine could process as much as 320,000 tons per year of ore and disturb about 53 acres over an 11-year life.

There is potential for diamond occurrences in association with the Quaternary volcanic rocks (lamprophyres) at Steamboat Mountain, located in the southern portion of the planning area (Hausel et al. 1995). Additional exploration would be needed to further define these deposits. Exploration might occur during the planning period. Access to the top of Steamboat Mountain is limited; therefore, exploration could consist of using a helicopter to bring in a drill rig to gather the required information. About 2 acres of disturbance would be anticipated from this type of activity.

Locatable minerals considered to have no foreseeable development potential in the planning area include uranium and deposits of copper, lead, zinc, and silver. Based on current information and commodity prices, gold and diamonds are the only mineral types that have potential for development in the planning area.

4.8.3.1 Common to All Alternatives

Under each of the management alternatives, mineral exploration, filing of claims, and issuing of patents would comply with the requirements of the Mining Law of 1872 and regulations at 43 CFR 3809. Exploration disturbing more than 5 acres, activities in excess of casual use, or activities located in special management areas must file plans of operation. Reclamation plans would be developed and bonds posted for these operations. Withdrawals from mineral location are in effect for coal and oil shale in the planning area. These withdrawals are no longer considered necessary and will be revoked. Because most of these withdrawal areas have low potential for locatable mineral development, the revocations would not have a significant impact on future locatable mineral development activity.

4.8.3.2 No Action Alternative

Areas that are currently open to mineral location are available for exploration, locating of claims, and mining. More than 150,000 acres are withdrawn from all mineral location. There are currently active claims in the Dickie Springs/Oregon Gulch area of the planning area. Exploration activity on these claims has typically disturbed 1 to 5 acres at a time through trenching with a backhoe or manual tools. Development of a large-scale commercial gold mine in the planning area is considered unlikely based on the size and grade of potential ore deposits and expected gold prices. Because development of existing or

new claims would be allowed in areas that have not been withdrawn from mineral location, there would be no additional impacts on exploration and mining of locatable minerals.

Exploration for diamonds is expected to occur in the planning area, resulting in a surface disturbance of approximately 2 acres. Additional disturbance would occur if a commercial diamond deposit were discovered. There is no sufficient information to evaluate the potential for development of a diamond find. There are no anticipated impacts on exploration and development activities for diamond mining because the diamond potential area is open to mineral location under this alternative.

4.8.3.3 Alternative 1

Under Alternative 1, more than 150,000 acres are withdrawn from mineral location. Requirements for exploration and mining activities are the same as under the No Action Alternative. Development of a large-scale commercial gold mine in the planning area is considered unlikely based on the size and grade of potential ore deposits, and expected gold prices. If a commercial deposit were discovered in the planning area, it is estimated that development of a mine could result in disturbance of about 53 acres over an expected mine life of 11 years. Up to 320,000 tons of ore would be mined. Because development of existing or new claims would be allowed in the areas that have not been withdrawn from mineral location, there will be no additional impacts on exploration and mining of locatable minerals.

Like the No Action Alternative, exploration for diamonds is expected to occur in the planning area, resulting in a surface disturbance of approximately 2 acres. Additional disturbance would occur if a commercial diamond deposit were discovered. There is no sufficient information to evaluate the potential for development of a diamond find. There are no anticipated impacts on exploration and development activities for diamond mining because the diamond potential area is open to mineral location under this alternative.

4.8.3.4 Alternative 2

The entire planning area would be withdrawn from mineral location under Alternative 2. Active claims would be evaluated, and any claims determined to be invalid would be declared null and void. Exploration and mining activity on claims determined to be valid could continue, typically disturbing 1 to 5 acres at a time through trenching with a backhoe or manual tools. No further impacts would occur from claims determined to be invalid. Development of a commercial mine could result in disturbance of about 53 acres over an expected mine life of 11 years. This could occur only if an existing claim were found to be valid and then successfully developed. Development of a large-scale commercial gold mine in the planning area is considered unlikely based on the size and grade of potential ore deposits and expected gold prices. The impact on gold mining under this alternative would include the loss of opportunity for exploration and development on any existing claims that would be declared null and void. In addition, the potential for development of a commercial mine, while unlikely based on geologic and economic factors, would be lost under this alternative.

No diamond exploration or development would occur under this alternative because there are no existing claims in potential diamond occurrence areas.

4.8.3.5 Alternative 3

Under Alternative 3, more than 160,000 acres would be withdrawn from mineral location. Active claims cover large areas within the proposed withdrawal areas. Those claims determined to be invalid would be declared null and void. The management action for locatable minerals would also include a designated area for recreational mining in the Dickie Springs/Oregon Gulch District. Approximately 5 acres would

be withdrawn from mineral location and would be actively managed to support recreational mining. This would include removal and stockpiling of topsoil in an active area to provide access to placer beds for recreational miners. As the active area is mined out, BLM would regrade the excavation and replace the stockpiled soil to reclaim the area. Approximately 1 acre would be actively managed for recreational mining at any given time. Development of a large-scale commercial gold mine in the planning area is considered unlikely based on the size and grade of potential ore deposits and expected gold prices. However, development of existing or new claims would be allowed under Alternative 3 on the areas that had not been withdrawn from mineral location. The net impact is expected to be greater than that of the No Action Alternative because more of the area with the highest interest for gold development would be withdrawn if existing claims were not found to be valid.

Proposed withdrawals include the area of highest potential for diamond occurrence in the planning area, resulting in no surface disturbance for diamond exploration. The impact on diamond exploration and mining would be similar to that of Alternative 2, since the highest potential area would be withdrawn from mineral location.

4.8.3.6 Proposed JMH CAP

Under the Proposed JMH CAP, just over 155,000 acres would be withdrawn from mineral location. Withdrawals would be pursued for the northern elk calving areas, and the potential diamond mining area of Steamboat Mountain ACEC. Active claims cover large areas within the proposed withdrawal areas. Those claims would be evaluated, and any claims determined to be invalid would be declared null and void. However, development of existing or new claims would be allowed under the Proposed JMH CAP for the areas that had not been withdrawn from mineral location. The net impact is expected to be greater than that of the No Action Alternative because more of the area with the highest interest for gold development would be withdrawn if existing claims were not found to be valid.

Proposed withdrawals include the area of highest potential for diamond occurrence in the planning area, resulting in no surface disturbance for diamond exploration. The impact on diamond exploration and mining would be similar to that of Alternative 2 because the area with the highest occurrence potential area would be withdrawn from mineral location.

4.8.4 Potential Impacts on Salable Minerals

Suitable construction materials are lacking on the lands that remain open to development of salable minerals, with the exception of Steamboat Mountain, which is capped by volcanic rock. Demand for material in the planning area is expected to increase during the planning period, commensurate with the increase in oil and gas development and the needs of the Wyoming Department of Transportation (WYDOT) for reconstruction of U.S. Highway 191 and State Highway 28. Currently, sand and gravel for oil and gas development come from outside the planning area. Other construction materials, such as those used for constructing road base, are located during selection of the road alignment. Reconstruction of U.S. Highway 191 and State Highway 28 would require about 25 acres of disturbance in addition to the 4 acres of existing disturbance associated with WYDOT's pit along State Highway 28. WYDOT has a need for a 10-acre site along the east side of U.S. Highway 191 within the planning area for a hot batch plant by the year 2003. The other 15 acres of disturbance would be associated with mineral material sites located elsewhere along U.S. Highway 191 and State Highway 28. Development of the mineral material sites is expected within the latter 10 years of the planning period.

Potentially usable clays occur primarily in the southern portion of the planning area. With the surface use constraints that exist in this area and the abundance of clay products available from other sources, no development of this resource is expected within the planning area during the planning period.

4.8.4.1 Common to All Alternatives

All sales, permits, and community use pits must be conducted under the requirements of the Mineral Material Sales Act of 1947 and must comply with BLM regulations for operation of quarries or pits, including reclamation standards.

4.8.4.2 No Action Alternative

Areas closed to mineral material sales under the Green River RMP would remain closed under the No Action Alternative. More than 215,000 acres of the planning area are closed to mineral material sales, including ACECs, WSAs, certain cultural sites, and special status plant species sites. The permanent closure of Steamboat Mountain was deferred in the Green River RMP, but this area is considered open for mineral material sales under the No Action Alternative. For areas open to mineral sales, mining and reclamation plans would be required, and use and management would be in conformance with other resource objectives. Each sale of mineral materials or establishment of a community use pit would require a site-specific evaluation. Sales and mining would be allowed as long as no unacceptable impacts occurred to other resources. This would limit development of salable minerals in areas with other sensitive resources, such as special status plant species. Seasonal restrictions could also be placed on development activities to avoid time-sensitive impacts on wildlife, such as effects on greater sage-grouse leks or elk calving areas. In general there are few deposits of gravel within the planning area that are suitable for use as construction materials. Most construction materials used in the planning area are transported to projects from outside sources. The impacts on mineral material sales under the No Action Alternative include the lost opportunity for resource development in closed areas and the additional costs associated with resource protection requirements and access restrictions on mineral sales. These impacts could be significant where site-specific requirements resulted in a mineral development's not being economically viable.

4.8.4.3 Alternative 1

Approximately 164,000 acres of the planning area would be closed to mineral sales under this alternative, including ACECs, WSAs, certain cultural sites, and special status plant species sites. For areas open to mineral sales, mining and reclamation plans would be required, and use and management would be required to comply with regulatory standards. Each sale of mineral materials or establishment of a community use pit would require a site-specific evaluation. Sales and mining would be allowed, unless there were demonstrated impacts on other resources that could not be reclaimed or mitigated. The impact of Alternative 1 on the use of mineral materials would be increased opportunity for mineral material sales, based on reduced costs associated with fewer restrictions for resource protection and more areas available in comparison with the No Action Alternative.

4.8.4.4 Alternative 2

The planning area would be closed to mineral material sales under Alternative 2, except where development is required to meet other planning objectives, such as road construction under the approved transportation plan. The impacts on development of mineral materials related to decreased opportunity for mining cannot be projected from available information, but less area would be available for development of mineral materials under this alterative than under any other alternative considered in this analysis. The loss of area with development potential from mineral sales would result in significant impacts where there was an economic interest in obtaining mineral materials.

4.8.4.5 Alternative 3

In addition to the areas closed to mineral material sales under the No Action Alternative, the lava portion of the Steamboat Mountain ACEC and the area within one-half mile of greater sage-grouse leks would be closed. More than 255,000 acres would be closed under this alternative. Although this provides more area where mineral material sales would be permitted than under the No Action Alternative and Alternative 1, the overall amount of mining would be reduced based on the closure of the most desirable resource portion of Steamboat Mountain ACEC. Some limited talus and landslide deposits could be developed for construction materials, provided that the site-specific analysis required for the sale did not identify any unacceptable impacts. The overall impact on development of mineral materials under this alternative would be greater than that under the No Action Alternative because additional closures would be implemented in the areas most favorable for development of the resource.

4.8.4.6 Proposed JMH CAP

In addition to the areas closed to mineral materials sales under the No Action Alternative, the lava portion of Steamboat Mountain, the Pinnacles Geologic Feature, and the area within one-half mile of greater sage-grouse leks, would be closed to mineral material sales. Steamboat Mountain ACEC and the Steamboat Mountain Management Area would be open to mineral material sales only when required to meet other planning objectives. More than 490,000 acres would be closed under this alternative. Other sales in the planning area would be carried out where needed to meet planning objectives for the area (e.g., construction of recreational facilities). Some limited talus and landslide deposits could be developed for construction materials, provided that the site-specific analysis required for the sale did not identify any unacceptable impacts. The overall impact on development of mineral materials under this alternative would be greater than that under the No Action Alternative because additional closures would be implemented in the areas most favorable for development of the resource.

4.8.5 Potential Impacts on Alternative Energy Development

Alternative energy developments, such as wind farms and solar arrays, could be developed in the planning area as long as a proposed development was compatible with the planning criteria under the respective alternative. However, there are currently no specific proposals to develop these resources in the planning area, and future demand cannot be anticipated. The planning area is not located near any major population centers that would provide large-scale markets for produced power but is near an electric transmission line running from the power generating plant near Jim Bridger Mine to the northwestern United States. A specific analysis of any future proposed development would have to be performed based on its location, size, and type. The significance of future potential impacts currently cannot be determined.

4.9 VISUAL RESOURCES

Visual resources are the features of the landscape that contribute to the scenic quality of an area. The four VRM classes (as defined in Chapter 3) provide for planning, designing, and evaluating projects by identifying permissible levels of landscape alteration while protecting overall scenic quality.

4.9.1 Potential Impacts on Visual Resources

The VRM classifications establish objectives that prescribe the amount of change allowed in the characteristic landscape. Impacts on resources and resource users resulting from implementation of the VRM classifications are discussed in those particular resource sections. This section describes potential

impacts on visual resources resulting from the implementation of management actions for other resource management categories.

An impact on visual resources would be considered significant if an activity or development occurred in an area that would be incompatible with the VRM classification objective.

For analysis purposes, it is assumed that VRM classifications would be incorporated into all project planning. Specific activities or developments that would not be compatible with VRM objectives would avoid those areas or would be modified and designed to meet the objectives. Activities or developments on state or private inholdings would not be significantly different so that proposed VRM classifications for surrounding public lands could not be achieved or maintained.

4.9.1.1 Common to All Alternatives

The planning area would be managed to maintain or improve scenic quality by managing the impacts of human activities and other intrusions on the visual landscape. The VRM classes provide the design standards for all surface disturbing projects. Projects would be designed, sited, screened, or painted to reduce adverse visual impacts regardless of the VRM classification.

WSAs would be managed as VRM Class I areas to preserve the natural setting and existing character of the landscape, having a beneficial impact on the visual resources of the area. The interim management policy for WSAs provides for temporary uses and limits surface disturbing activities to accommodate valid existing rights. This policy, together with the VRM Class I objective, would ensure the preservation of the wilderness characteristics of these areas.

4.9.1.2 No Action Alternative

WSAs would be managed as VRM Class I areas to preserve the natural setting and existing character of the landscape. The Oregon Buttes ACEC and the western portion of the Greater Sand Dunes ACEC, which fall within WSAs, would also be managed as VRM Class I areas. The areas adjacent to WSAs, Steamboat Mountain ACEC (southern portion), and the remaining ACECs would be managed as VRM Class II areas. Steamboat Mountain ACEC (northern portion), Split Rock, Eden Valley, portions of White Mountain, and the portion of the Red Desert Watershed within the planning area would be managed as VRM Class III areas. All areas not managed as VRM Class I, II, or III for this alternative would be managed as VRM Class IV (Map 13).

Management of land and water resources would not have significant impacts on visual resources. The implementation actions generally limit the extent of surface disturbing activities or vegetation removal that could affect the character of the landscape. Range improvements and water developments would be compatible in VRM Class III and Class IV areas. Any improvements or developments proposed for areas of VRM Class II would result in only a low level of change to the landscape and would not likely attract the attention of the casual observer; thus, impacts would be negligible. Management actions that served to maintain or enhance land and water resources would provide beneficial impacts by improving overall visual quality.

Heritage sites such as White Mountain Petroglyphs, National Historic and National Scenic Trails, Boars Tusk, Crookston Ranch, and Tri-Territory Marker contribute to the character of the landscape. Managing and protecting these heritage resources in the planning area, including protection of Native American respected places, would directly benefit visual resources. Consultation with Native American tribal representatives could result in changes to a project design and location that would otherwise be

compatible with VRM objectives, which could either benefit or adversely affect the scenic quality of the area.

Management of travel and access could have adverse impacts on visual resources by facilitating access and use within the planning area. Road construction and vehicle use can remove vegetation and alter the physical characteristics of the landscape. Impacts would be reduced by identifying and controlling highly traveled routes and providing for orderly development that is compatible with VRM objectives. The OHV designations would be compatible with VRM objectives. Any adverse impact on visual resources from surface disturbance or vegetation removal caused by OHV use would be minimal, provided that users adhered to the OHV designations.

The use of the planning area by recreationists, and the actions proposed for managing the recreation resources, would not have any adverse impact on the overall character of the landscape. The expansion of facilities at the Sand Dunes OHV recreation site would be designed to blend into the existing landscape of the area. The projected increase in recreationists using the planning area could affect the scenic quality of localized areas that experienced increased camping or other use. Any adverse impact would likely be insignificant because these small areas would be closed if resource damage occurred.

Oil and gas development and production facilities could have adverse impacts on visual resources in VRM Class II areas. The significance of this impact would depend on the amount of development projected to occur within Class II areas and the success of mitigation (siting, painting, and screening) to reduce visual effects. The addition of structures, particularly wells and power lines, to the landscape could have long-term adverse effects on scenic quality in the planning area; however, the visual intrusion of these structures would be site-specific and would not affect viewers outside the viewshed of each well site. Facilities in VRM Class III areas would not significantly impact the scenic quality of these areas, provided that the facilities did not dominate the view of the casual observer. Oil and gas development facilities would be compatible with VRM Class IV objectives, but mitigation measures would also be required as necessary to ensure that adverse visual impacts would be minimal.

Surface disturbing activities associated with the construction of facilities and linear ROWs for pipelines, transmission lines, communication lines, and oil and gas development could adversely impact visual resources. Land clearing and grading activities necessary for construction remove vegetation, which could temporarily and sometimes permanently alter the characteristics of the landscape. Belowground utilities and aboveground pipelines would be compatible with VRM Class III and Class IV designations and could be approved within Class II designations provided that adequate mitigation could be implemented, the results of which would not attract the attention of the casual observer. Aboveground power lines would not be allowed in the Red Desert Watershed Management Area, benefiting the viewshed in this area.

Site-specific nonlinear ROWs for microwave, transmitter, and other communication towers would be compatible with VRM Class IV designations. Communication sites would be allowed on Essex Mountain and Pacific Butte, having an adverse effect on visual resources, particularly in areas identified as respected places by Native Americans.

Withdrawing lands from certain resource uses would have beneficial impacts on scenic quality by limiting or prohibiting surface disturbing activities. Areas of notable scenic quality that would be withdrawn from mineral location include the White Mountain Petroglyphs, Greater Sand Dunes ACEC, Crookston Ranch, Tri-Territory Marker, and South Pass Summit. Surface disturbance associated with mining claims could have the potential to affect visual settings; however, fewer than 100 acres within the planning area would be assumed to be disturbed over the planning period as a result of locatable mineral activity. Thus, any adverse impact would likely be insignificant. Where mining activities would disturb more than 5 acres of

land outside a special management area, a plan of operations would be required and a resource evaluation would be completed, thereby minimizing the potential impact on the character of the landscape.

Special management area management prescriptions (Map 13) would provide protection to visual resources by limiting or controlling surface disturbing activities. These areas are classified as VRM Class I and Class II; thus, any allowable visual intrusion would preserve or retain the existing landscape. This would have beneficial effects on the character and scenic quality of the landscape.

4.9.1.3 Alternative 1

WSAs would be managed as VRM Class I areas to preserve the natural setting and existing character of the landscape. The Oregon Buttes ACEC and the western portion of the Greater Sand Dunes ACEC, which fall within WSAs, would also be managed as VRM Class I areas. The areas adjacent to WSAs and the South Pass Historic Landscape ACEC, the Greater Sand Dunes ACEC, and the White Mountain Petroglyphs ACEC would be managed as VRM Class II areas. No areas would be managed as VRM Class III. All areas not managed as VRM Class I or II for this alternative would be managed as VRM Class IV (Map 25).

This alternative would provide more opportunities to use and develop the planning area; thus additional surface disturbance and construction of facilities would be anticipated. More than half of the planning area would be classified as VRM Class IV. This would result in more effects on visual resources than would occur under the No Action Alternative.

The management of land and water resources under this alternative, like similar management under the No Action Alternative, would not have significant impacts on visual resources. Although more range improvements and water development projects would be expected, adverse impacts on the scenic quality of the planning area would be negligible because these projects would result in minimal change to the landscape and would not likely attract the attention of the casual observer. Beneficial impacts would be greatly reduced because of fewer actions designed to enhance land and water resources.

Heritage sites contribute to the character of the landscape and would be managed much as they would under the No Action Alternative. The area within one-quarter mile of Native American respected places would be protected from surface disturbing and disruptive activities. An adverse impact on visual resources and the viewers of these resources could occur if the character of the landscape of any respected place were altered to the extent that it lost its significance. Consultation with Native American tribal representatives could result in changes to a project design and location that would otherwise be compatible with the VRM objective, which could either benefit or adversely affect the scenic quality of the area. Benefits would be less than those under the No Action Alternative.

The OHV designations would be compatible with VRM objectives. Any adverse impact on visual resources in VRM Class II areas from surface disturbance or vegetation removal caused by OHVs would be minimal, provided that OHV users adhered to OHV designations.

Management of recreation resources would not have any adverse impact on the character of the landscape. The types of recreation activities occurring throughout the planning area would be compatible with VRM objectives. The resource user would likely be affected by visual intrusions on the landscape that could occur in a majority of the planning area. However, visual appeal is subjective; thus, the significance of any impact would vary among observers.

Oil and gas development and production facilities could have adverse impacts on visual resources in VRM Class II areas, as they would under the No Action Alternative. However, the overall extent of any

impact on Class II areas would be slightly less than that of the No Action Alternative because there would be less Class II land area with the change in VRM class in the Steamboat Mountain area. The addition of structures, particularly wells and power lines, to the landscape could have long-term adverse effects on the scenic quality of the planning area; however, the visual intrusion of these structures would be compatible with the VRM objectives, and mitigation measures would also be required as necessary to ensure that adverse visual impacts would be minimal.

Surface disturbing activities associated with the construction of facilities and linear ROWs for pipelines, transmission lines, communication lines, and oil and gas development would not have significant adverse impacts on visual resources because the areas where development would likely occur would be compatible with VRM Class IV objectives. Aboveground power lines would not be allowed in the Red Desert Watershed Management Area, which would benefit the viewshed in this area.

Site-specific nonlinear ROWs for microwave, transmitter, and other communication towers would be compatible with VRM Class IV designations and thus would be allowed in many locations in the planning area. Communication sites would be considered for Steamboat Mountain, Essex Mountain, and Pacific Butte. This could have an adverse effect on visual resources, particularly in areas identified as respected places by Native Americans.

Although most of the planning area would be open to mineral location, areas of notable scenic quality, including White Mountain Petroglyphs, Crookston Ranch, Tri-Territory Marker, and South Pass Summit, would be withdrawn from mineral location. As under the No Action Alternative, surface disturbance associated with mining claims could affect visual settings. Fewer than 100 acres within the planning area would be assumed to be disturbed over the planning period because of locatable mineral activity; thus, any adverse impact would likely be insignificant. Where mining activities would disturb more than 5 acres of land outside a special management area or in a VRM Class II area, a plan of operations would be required and a resource evaluation would be completed, thereby minimizing the potential impact on the character of the landscape.

Special management areas would be classified as VRM Class I and Class II areas and would provide protection to visual resources by limiting or controlling surface disturbing activities. No visual intrusion would be allowed unless the existing landscape could be preserved or retained, having overall beneficial effects on the character and scenic quality of the area. However, the overall extent of any impact on the planning area would be slightly less than that of the No Action Alternative because there would be less Class II land area with the removal of the Class II designation from the Steamboat Mountain ACEC.

4.9.1.4 Alternative 2

WSAs would be managed as VRM Class I areas to preserve the natural setting and existing character of the landscape. The Oregon Buttes ACEC and the western portion of the Greater Sand Dunes ACEC, which fall within WSAs, would also be managed as VRM Class I areas. Other areas managed as VRM Class I include all other ACECs, the Red Desert Watershed, Indian Gap, the Pinnacles Geographic Area, and portions of White Mountain. All sensitive habitat areas, wetlands, riparian areas, floodplains, split rock, and the Continental Peak/South Pass Connecting Side Trail would be managed as VRM Class II areas. All areas not managed as VRM Class I or II for this alternative would be managed as VRM Class III. No areas would be managed as VRM Class IV (Map 36).

This alternative would provide fewer opportunities to develop the planning area; thus, surface disturbance and construction of facilities would be curtailed. Approximately 85 percent of the planning area would be classified as VRM Class I and Class II; thus, beneficial impacts on visual resources would be anticipated through preservation and retention of the existing character of the landscape.

As under the No Action Alternative, management of land and water resources under this alternative would not have significant impacts on visual resources. Although range improvements and water development projects would be expected, they would be fewer in number than under the No Action Alternative, and adverse impacts on the scenic quality of the planning area would be negligible because these projects would result in minimal change to the landscape and would not likely attract the attention of the casual observer. Beneficial impacts would be greatest under this alternative because of increased efforts to enhance land and water resources.

Heritage sites contribute to the character of the landscape and would be managed much as they would under the No Action Alternative. Nomination of specific sites to the NRHP, and related management actions, would benefit scenic quality by providing additional protection to any viewshed that contributed to the sites' eligibility. The protection of Native American respected places would also directly benefit visual resources. Consultation with Native American tribal representatives could result in changes to a project design and location that would otherwise be compatible with the VRM objective, benefiting the scenic quality of these areas.

As under the No Action Alternative, management of travel and access could have adverse impacts on visual resources by facilitating access and use within the planning area. Road construction and vehicle use can remove vegetation and alter the physical characteristic of the landscape. Impacts would be less extensive than under the No Action Alternative because of implementation of a transportation plan specific to the planning area. Moreover, closing a majority of the planning area to OHV use would minimize related impacts on visual resources, provided that users adhered to OHV designations.

As under the No Action Alternative, management of recreation resources under this alternative would not have any impact on the character of the landscape. The types of recreation activities occurring throughout the planning area would be compatible with VRM objectives.

Oil and gas development and production facilities could have adverse impacts on visual resources in VRM Class I and Class II areas. Facilities in VRM Class III areas would not significantly impact the scenic quality of the area, provided that the facilities would not dominate the view of the casual observer.

Surface disturbing activities associated with the construction of facilities and linear ROWs could adversely impact visual resources. However, impacts would be the least extensive under this alternative because of the large amount of area subject to NSO stipulations, which would limit the level of development occurring in the planning area and thereby reduce related impacts on visual resources. In addition, aboveground power lines would not be allowed in the Red Desert Watershed Management Area, benefiting the viewshed in this area. Belowground utilities and aboveground pipelines would be compatible with VRM Class III areas and could be approved within Class II designations provided that adequate mitigation could be implemented, the results of which would not attract the attention of the casual observer. Site-specific nonlinear ROWs for microwave, transmitter, and other communication towers would also be compatible with VRM Class III classifications.

The planning area would be withdrawn from mineral location; thus, no adverse impacts on visual resources from such activities would be expected.

Special management areas would be classified as VRM Class I and Class II areas and would provide protection to visual resources by prohibiting any visual intrusion that would not preserve or retain the existing landscape. Management of additional areas that would be designated as special management areas would have beneficial effects on the scenic quality of the landscape.

4.9.1.5 Alternative 3

WSAs would be managed as VRM Class I areas to preserve the natural setting and existing character of the landscape. The Oregon Buttes ACEC and the western portion of the Greater Sand Dunes ACEC, which fall within WSAs, would also be managed as VRM Class I areas. The remaining ACECs, areas adjacent to the WSAs, the portion of the Red Desert Watershed within the planning area, and the Continental Peak/South Pass Connecting Side Trail would be managed as VRM Class II areas. Unique geological features and landforms, including Boars Tusk, Split Rock, and portions of White Mountain, would also be managed as VRM Class II areas. Eden Valley would be managed as a VRM Class III area. All areas not managed as VRM Class I, II, or III for this alternative would be managed as VRM Class IV (Map 47).

This alternative would provide opportunities to use and develop the planning area; thus, surface disturbance and construction of facilities that could adversely impact visual resources would be anticipated. Approximately two-thirds of the planning area would be classified as VRM Class I and Class II; thus, beneficial impacts on visual resources would be greater than under the No Action Alternative but less than under Alternative 2.

As under the other alternatives, management of land and water resources under this alternative would not have significant impacts on visual resources. Although range improvements and water development projects would be expected, adverse impacts on the scenic quality of the planning area would be negligible because these projects would result in minimal change to the landscape and would not likely attract the attention of the casual observer. Beneficial impacts would be greater than under the No Action Alternative because of increased efforts to enhance land and water resources.

The impacts on visual resources from management of heritage resources would be similar to those under the No Action Alternative and Alternative 2. Nomination of specific sites to the NRHP, and related management actions, would benefit scenic quality by providing additional protection to any viewshed that contributed to the sites' eligibility. Protection of Native American respected places would also directly benefit visual resources.

As under the No Action Alternative, management of travel and access could have adverse impacts on visual resources by facilitating access and use within the planning area. Road construction and vehicle use can remove vegetation and alter the physical characteristics of the landscape. Impacts would be less extensive than under the No Action Alternative because of implementation of a transportation plan and the closure of more areas to OHV use. Any adverse impact on visual resources from surface disturbance or vegetation removal caused by OHVs would be minimal provided that users adhered to OHV designations.

Oil and gas development and production facilities could have adverse impacts on visual resources in VRM Class I and Class II areas, similar to those under Alternative 2. However, the significance of this impact would depend on the amount of development projected to occur within Class I and Class II areas and the extent of mitigation (siting, painting, screening) applied to the proposed activity to protect scenic quality. Impacts would be greater than under Alternative 2 because of the removal of the NSO stipulation and changes to OHV restrictions within the greater sage-grouse winter range. Facilities in VRM Class III areas would not significantly impact the scenic quality of these areas, provided that the facilities would not dominate the view of the casual observer and would be compatible with VRM Class III objectives.

Construction of facilities and linear ROWs could adversely impact visual resources; however, impacts would be minimized by limiting these activities to areas identified for such use. Belowground utilities and aboveground pipelines would be compatible with VRM Class III and Class IV and could be approved

within Class II designations provided that adequate mitigation could be implemented, the results of which would not attract the attention of the casual observer. Aboveground power lines would not be allowed in the Red Desert Watershed Management Area, benefiting the viewshed in this area. This would reduce adverse impacts on the scenic value of the area.

Communication sites would be compatible with VRM Class IV designations. Areas closed to communication sites, as well as Class I areas and Class II areas that required mitigation to reduce sight intrusion, would benefit scenic quality. As under the No Action Alternative, communication sites on Essex Mountain and Pacific Butte could have an adverse effect on visual resources, particularly in areas identified as respected places by Native Americans.

Although most of the planning area would be open to mineral location, areas of notable scenic quality would be withdrawn from mineral location, as under the No Action Alternative. Fewer than 100 acres within the planning area would be assumed to be disturbed over the planning period as a result of locatable mineral activity; thus, any adverse impact on visual resources from surface disturbance or mining facilities would likely be insignificant. Where mining activities would disturb more than 5 acres of land outside a special management area or in a VRM Class II area, a plan of operations would be required and a resource evaluation would be completed, thereby minimizing potential adverse impacts on the character of the landscape.

Management of recreation resources could adversely impact the viewshed of the National Historic Trail. Limiting recreational mining activity to a 5-acre site in the Dickie Springs-Oregon Gulch Gold Placer Mining District area would concentrate such mining activities and increase vehicle travel to the site, which could subsequently create dust plumes visible from the trail. Although this would increase the difficulty of managing the viewshed, impacts would likely be minimal because of the limited amount of recreational mining activity that occurs in the planning area. Adhering to VRM class requirements would ensure that recreational activities would not cause significant impacts on visual resources.

As under Alternative 2, special management areas would be classified as VRM Class I and Class II and would provide protection to visual resources by prohibiting any visual intrusion that would not preserve or retain the existing character of the landscape. Management of additional areas designated as special management areas under this alternative would have beneficial effects on the scenic quality of the landscape.

4.9.1.6 Proposed JMH CAP

WSAs would be managed as VRM Class I areas to preserve the natural setting and existing character of the landscape. The Oregon Buttes ACEC and the western portion of the Greater Sand Dunes ACEC, which fall within WSAs, would also be managed as VRM Class I areas. The interim management policy for WSAs provides for temporary uses and limits surface disturbing activities to accommodate valid existing rights. This policy, together with the VRM Class I objective, would ensure the preservation of the wilderness characteristics of these areas. All ACECs, the Steamboat Mountain Management Area, the Pinnacles Geologic Feature, the areas adjacent to the WSAs, portions of White Mountain, and the West Sand Dunes Archaeological District would be managed as VRM Class II areas. Split Rock, Eden Valley, portions of White Mountain, and the portion of the Red Desert Watershed within the planning area would be managed as VRM Class III areas. All areas not managed as VRM Class I, II, or III for this alternative would be managed as VRM Class IV (Map 59).

The planning area would be managed to maintain or improve scenic quality by managing the impacts of human activities and other intrusions on the visual landscape. The VRM classes provide the design

standards for all surface disturbing projects. Projects would be designed, sited, screened, or painted to reduce adverse visual impacts regardless of the VRM classification.

Management of land and water resources would not have significant impacts on visual resources. The implementation actions generally limit the extent of surface disturbing activities or vegetation removal that could affect the character of the landscape. Range improvements and water developments would be compatible with VRM Class III and Class IV objectives. Any improvements or developments proposed for VRM Class II areas would result in only a low level of change to the landscape and would not likely attract the attention of the casual observer; thus, impacts would be negligible. Beneficial impacts could be slightly greater than under the No Action Alternative because of increased efforts to enhance land and water resources.

Heritage sites such as White Mountain Petroglyphs, National Historic and National Scenic Trails, Boars Tusk, Crookston Ranch, and Tri-Territory Marker contribute to the character of the landscape. Managing and protecting these heritage resources in the planning area, including the protection of Native American respected places, would directly benefit visual resources. Consultation with Native American tribal representatives could result in changes to a project design and location that would otherwise be compatible with the VRM objective, which could either benefit or adversely affect the scenic quality of the area.

Management of travel and access could have adverse impacts on visual resources by facilitating access and use within the planning area. Road construction and vehicle use can remove vegetation and alter the physical characteristics of the landscape. Impacts would be reduced by identifying and controlling highly traveled routes and providing for orderly development that is compatible with VRM objectives. The OHV designations would be compatible with VRM objectives. Any adverse impact on visual resources from surface disturbance or vegetation removal caused by OHV use would be minimal provided that users adhered to OHV designations. Implementation of a transportation plan specific to the planning area would help reduce impacts compared with the No Action Alternative.

The use of the planning area by recreationists, and the actions proposed for managing the recreation resources, would not have any adverse impact on the character of the landscape. The expansion of facilities at the Sand Dunes OHV recreation site would be designed to blend into the existing landscape of the area. The projected increase in recreationists using the planning area could affect the scenic quality of localized areas that experienced increased camping or other use. Any adverse impact would likely be insignificant because these small areas would be closed if resource damage occurred.

Surface disturbing activities associated with the construction of facilities and linear ROWs for pipelines, transmission lines, communication lines, and oil and gas development could adversely impact visual resources. Land clearing and grading activities necessary for construction remove vegetation, which could temporarily and sometimes permanently alter the characteristics of the landscape. Belowground utilities and aboveground pipelines would be compatible with VRM Class III and Class IV designations and could be approved within Class II designations provided that adequate mitigation could be implemented, the results of which would not attract the attention of the casual observer. Aboveground power lines would not be allowed in the Red Desert Watershed Management Area, which would benefit the viewshed in this area.

Oil and gas development and production facilities could have adverse impacts on visual resources in VRM Class II areas. The significance of this impact would depend on the amount of development projected to occur within Class II areas and the success of mitigation (siting, painting, screening) to reduce visual effects. The addition of structures, particularly wells and power lines, to the landscape could have long-term adverse effects on the scenic quality of the planning area; however, the visual

intrusion of these structures would be site-specific and would not affect viewers outside the viewshed of each well site. Facilities in VRM Class III areas would not significantly impact the scenic quality of the area provided that the facilities would not dominate the view of the casual observer. Oil and gas development and production facilities would be compatible with VRM Class IV objectives, but mitigation measures would also be required as necessary to ensure that adverse visual impacts would be minimal. These impacts could be reduced in Area 3 (Figure A17-1) of the fluid mineral leasing implementation strategy (Appendix 17). The majority of Area 3 would be closed to new oil and gas leasing, which could result in fewer visual intrusions in this area. Over the long term, impacts in Area 3 would be minimized because all leases in this area would expire within an 11-year time period.

Site-specific nonlinear ROWs for microwave, transmitter, and other communication towers would be compatible with VRM Class IV designations. Adequate mitigation measures (siting, painting, screening) would be implemented where possible. Communication sites would be allowed on portions of Essex Mountain and Pacific Butte. This would have an adverse effect on visual resources, particularly in areas identified as respected places by Native Americans, although adverse effects would be less than those under the No Action Alternative.

Withdrawing lands from certain resource uses would have beneficial impacts on scenic quality by limiting or prohibiting surface disturbing activities. Areas of notable scenic quality that would be withdrawn from mineral location include the White Mountain Petroglyphs, Greater Sand Dunes ACEC, Crookston Ranch, Tri-Territory Marker, and South Pass Summit. Surface disturbance associated with mining claims could affect visual settings; however, fewer than 100 acres within the planning area would be assumed to be disturbed over the planning period as a result of locatable mineral activity. Thus, any adverse impact would likely be insignificant. Where mining activities would disturb more than 5 acres of land outside a special management area, a plan of operations would be required and a resource evaluation would be completed, thereby minimizing potential impact on the character of the landscape.

Special management area management prescriptions would provide protection to visual resources by limiting or controlling surface disturbing activities. These areas are classified as VRM Class I and Class II; thus, any allowable visual intrusion would preserve or retain the existing landscape. This would have overall beneficial effects to the character and scenic quality of the landscape.

4.10 SPECIAL MANAGEMENT AREAS

Special management areas (SMA) require special management prescriptions to ensure that the areas and their resources are managed and protected from irreparable damage. These areas include WSAs, ACECs, special recreation management areas (SRMA), and other areas, including watersheds.

4.10.1 Potential Impacts on Special Management Areas

SMAs provide management for unique natural, historic, scenic, or recreational resources in the planning area, having a beneficial impact on resources and nonenvironmental effects on resource users. Impacts on resources and resource users resulting from implementation of SMA management prescriptions are discussed in those particular resource sections. This section describes potential impacts on SMAs resulting from the implementation of management actions for other resource management categories.

An impact on SMAs would be considered significant if a level of development or activity occurred that would be incompatible with the SMA objectives and management prescriptions. A significant impact would result if an activity or development would impair the suitability of WSAs for preservation as wilderness or if resources were adversely affected to the point that the current SMA no longer met the criteria for designation.

For analysis purposes, it is assumed that all areas existing and proposed as ACECs meet the relevance and importance criteria. It is also assumed that the WSAs would remain under wilderness review and that wilderness designation or nondesignation would not occur during the planning period. The WSAs would continue to be managed under the Interim Management Policy and Guidelines for Lands Under Wilderness Review. Activities or developments on state or private inholdings would not significantly affect the criteria necessary to maintain designations, nor would they be significantly affected by SMA management prescriptions.

4.10.1.1 Common to All Alternatives

The existing SMAs would continue to be managed to preserve and protect the integrity and character of the specific areas, in accordance with ACEC policies and WSA interim management policies. All management actions and resource uses would focus on the protection of sensitive environmental resources and the health and safety of the user.

Management of land and water resources would not have significant impacts on SMAs. Special management area values include geologic features, fragile plant species habitat, cultural and historical values, visual values, recreation values, and unique wildlife habitat. The implementation actions generally limit the extent of surface disturbing activities, vegetation removal, and season of use, providing protection of wildlife habitat and locations of special status plant species. Livestock grazing implementation actions would be evaluated and modified as needed to be consistent with the management prescriptions of SMAs. These land and water implementation actions generally coincide with the management objectives of SMAs.

Heritage sites, such as White Mountain Petroglyphs, Boars Tusk, Killpecker Sand Dunes, South Pass, and National Historic and National Scenic Trails, are part of or are located within existing SMA boundaries. Managing and protecting these heritage resources, including the protection of related Native American respected places, would not impact the management prescriptions of SMAs. Implementation actions for managing heritage resources would be complementary to SMA objectives.

Land adjustments and exchanges of state lands within WSAs and other SMAs identified in the Green River RMP would be pursued. Acquiring state inholdings would likely result in beneficial impacts on the resources in SMAs because BLM could implement cohesive management prescriptions and avoid fragmentation of these areas.

Management of recreation resources would have beneficial impacts on SMA resources. The WSAs and ACECs are popular recreation destinations; thus, the preparation of recreation site plans and placement of interpretive signs would have beneficial impacts on both the resource and the user. Recreational management actions could have an overall indirect beneficial effect on SMA resources through public education via interpretive materials on the importance of protecting and preserving unique resources. The preparation of recreation project plans for the National Historic Trails, Crookston Ranch, Boars Tusk, and White Mountain Petroglyphs would benefit the users of these resources by providing interpretive materials on historical and cultural sites of interest.

WSAs would be managed as VRM Class I areas to preserve the natural setting and existing character of the landscape, having a beneficial impact on SMA resources. The interim management policy for WSAs provides temporary uses and limits surface disturbing activities. This policy, together with the VRM Class I objective, would ensure the preservation of the wilderness characteristics of these areas.

The implementation prescriptions proposed for managing SMAs would have direct beneficial effects on the resources of those SMAs and thus would indirectly benefit the continued management of these areas

as SMAs. As stated above, the potential impacts of implementing these management prescriptions are discussed separately for each resource management category.

4.10.1.2 No Action Alternative

Managing wildlife and the associated restrictions on OHV use could have some indirect impacts on some SMAs caused by limiting access to otherwise popular recreational OHV sites. At the same time, these actions could prove to be beneficial in the management of soil erosion and compaction because the seasonal restrictions are in place during a time of wet conditions. Although the actions could have beneficial and adverse impacts, these are expected to be minimal because of the seasonal nature of these restrictions.

Managing travel and access throughout the planning area could have beneficial impacts on SMA resources by identifying and controlling highly traveled routes and providing for orderly development that would be compatible with SMA objectives. The OHV designations would be compatible with SMA management prescriptions. Any impact on the integrity and maintenance of the designated area from surface disturbance or vegetation removal caused by OHVs would be minimal, provided that OHV users adhered to OHV designations.

Surface disturbing activities associated with the construction of facilities and linear ROWs for pipelines, transmission lines, communication lines, and oil and gas development could adversely impact SMAs. Such activities could affect the integrity and continued maintenance of the area as an SMA and would be visually apparent to the users of the areas. However, with the implementation of management prescriptions for SMAs, including the interim management guidelines for WSAs that prohibit impairment, any impact would be insignificant.

Withdrawing lands from mineral location and revoking existing withdrawals would impact SMA resources and resource users. The oil shale and coal classification would be revoked, and upon its revocation, all SMAs, with the exception of White Mountain Petroglyphs, the Greater Sand Dunes ACEC, special status plant sites, Crookston Ranch, Tri-Territory Marker, and South Pass Summit, would be open for mineral location (Map 5), potentially having an adverse effect on SMA resources. However, a plan of operations would be required and a resource evaluation would be completed for any mining activity within an SMA, thereby minimizing potential impacts on the characteristics of the area that support its special designation.

The VRM classifications could have beneficial effects through the protection of viewsheds associated with historic resources, such as South Pass Historic Landscape, and with sites of concern to Native Americans, such as White Mountain Petroglyphs. The VRM Class II designation for these locations, the southern portion of Steamboat Mountain ACEC, the remaining ACECs, and areas adjacent to the WSAs would limit the design and placement of structures to blend in with the landscape. Much of the Red Desert Watershed Management Area would be managed as a VRM Class III area to retain the existing character of the landscape. These classifications would have a beneficial effect by maintaining the resource integrity for which the areas were designated.

4.10.1.3 Alternative 1

Managing travel, access, and OHV use throughout the planning area would have impacts similar to those under the No Action Alternative. However, impacts could be greater because of less restrictive OHV management actions (i.e., fewer seasonal closures and less area limited to designated roads and trails).

Adverse impacts from surface disturbing activities associated with the construction of facilities and linear ROWs for pipelines, transmission lines, communication lines, and oil and gas development would be greater than under the No Action Alternative. These activities could affect the criteria for SMA designation, potentially resulting in significant impacts on SMA resources. Implementation of management prescriptions for WSAs, including the interim management guidelines that prohibit impairment, would greatly reduce adverse impacts in those areas. Implementation of other SMA management prescriptions would reduce adverse impacts; however, adverse impacts are not expected to be reduced to a level where they would be insignificant.

The withdrawal of lands from mineral location would have the same impacts as those under the No Action Alternative, except that the Greater Sand Dunes ACEC would be open for mineral location. This would have adverse effects on the Greater Sand Dunes ACEC. However, a plan of operations would be required and a resource evaluation would be completed for any mining activity within the SMA, thereby minimizing potential impacts on the characteristics of the ACEC that support its special designation.

Effects from VRM classifications would be the same as those under the No Action Alternative, except that much of the Red Desert Watershed Management Area would be managed as VRM Class IV. This might have significant adverse impacts on the existing character of the landscape by compromising the resource integrity for which the area was designated.

4.10.1.4 Alternative 2

Greater beneficial impacts on SMA resources would occur due to the management of travel and access throughout the planning area through creation of a transportation plan. The plan would identify and control highly traveled routes, providing for orderly development that would be compatible with ACEC and WSA objectives, and provide maximum protection for sensitive resources. The OHV designations would be compatible with SMA management prescriptions. Managing travel and restricting OHV use within the greater sage-grouse winter range could result in greater impacts on SMAs than would occur under the No Action Alternative by generating heavier use in SMAs. Any impact on the integrity and maintenance of designated SMAs from surface disturbance or vegetation removal caused by OHVs would be minimal provided that OHV users adhered to OHV designations.

Adverse impacts on SMA resources from surface disturbing activities associated with the construction of facilities and linear ROWs for pipelines, transmission lines, communication lines, and oil and gas development would be the least extensive under this alternative because of ROW avoidance or exclusion and controlled surface use or NSO prescriptions for all SMAs.

All SMAs would be closed to coal and other solid mineral exploration, leasing, and development and withdrawn from mineral location. No new leases for fluid minerals would be offered in any SMA. These actions would have significant beneficial impacts on the SMAs by protecting the resources from the surface disturbance associated with mineral development activities.

The VRM classifications under this alternative would have greater beneficial effects on SMA resources than would those under the No Action Alternative because all SMAs would be classified as Class I.

Additions to and expansions of ACECs would significantly benefit the resources within these areas because of the amount of land area and management prescriptions associated with these designations. The proposed expansion of the Greater Sand Dunes ACEC to include the paleosol deposition area would ensure protection to significant geological and archeological components of the study of early human habitation of North America. This area meets the relevance criteria of significant historic and cultural value and the importance criteria of having a locally significant quality that makes the area rare,

irreplaceable, and unique. This area would be further evaluated as a research natural area (RNA) and maintained for the primary purpose of research and education. The RNA would primarily be used for nonmanipulative research and baseline data gathering. Another RNA would be proposed for the dunal ponds within the Sand Dunes WSA portion of the Greater Sand Dunes ACEC. These ponds are a unique water resource that supports various forms of aquatic and terrestrial wildlife and would also be managed for minimal human and animal disturbance, thus benefiting these resources.

The proposed expansion of the Steamboat Mountain ACEC would ensure protection of important wildlife habitat, a unique vegetation type, and significant heritage resources. These areas meet the relevance and importance criteria for wildlife and cultural values of national significance and contain unique habitat features found nowhere else in the planning area. The basin big sagebrush/lemon scurfpea vegetation type within the expanded ACEC area would be evaluated for designation as an RNA, which would be managed for minimum human disturbance. The RNA would be established and maintained for the primary purpose of protecting qualities that make the basin big sagebrush/lemon scurfpea fragile, sensitive, rare, and vulnerable to adverse change.

The Special Status Plant Species ACEC would be expanded into the JMH CAP planning area to include BLM-administered land occupied by all Wyoming BLM special status plant species and any potential habitat for these species. This would provide beneficial effects to these species by providing protective measures for their propagation and survival.

The cushion plant community would meet the relevance criteria for rare and endemic plants and plant communities and would be designated an ACEC. This ACEC would be managed as an RNA for scientific research and education to learn more about these unique plant species and associations. This would represent a significant beneficial impact for these species by raising awareness of the species and providing protective measures for their propagation and survival.

Management of the Pinnacles Geographic Area, which includes the Pinnacles Geologic Feature ACEC, would significantly benefit the natural resources within this area. Access to the parcel of state land adjacent to this area would be provided via an existing road; the presence and any future maintenance of this road would not impact the manageability of the Pinnacles Geographic Area. The proposed management action of pursuing land exchanges for improving management of resources and minimizing habitat fragmentation would apply to this parcel of state land, thereby improving the manageability of the area. There are no existing mining claims within the Pinnacles Geographic Area, which would eliminate any impact on the manageability of the area from existing or future claims. The proposed implementation actions for this alternative include the buy-back and exchange of leases located in areas of sensitive resources, and no new leases would be offered in sensitive resource areas. Therefore, the manageability of this area would be compatible with management actions for other resources in the planning area. Activities to support livestock operations, such as water developments and range improvements, would be allowed within the Pinnacles Geographic Area, provided that the construction, use, and maintenance of the facilities were in compliance with the management prescriptions for this area.

4.10.1.5 Alternative 3

Managing travel and access throughout the planning area through creation of a transportation plan could have greater beneficial impacts on SMA resources than under the No Action Alternative by identifying and controlling highly traveled routes, providing for orderly development that would be compatible with SMA objectives and providing maximum protection for sensitive resources. The OHV designations would be compatible with SMA management objectives and prescriptions. Any impact on the integrity and maintenance of the designated area from surface disturbance or vegetation removal caused by OHVs would be minimal provided that OHV users adhered to OHV designations.

The effects of surface disturbing activities associated with the construction of facilities and linear ROWs for pipelines, transmission lines, communication lines, and oil and gas development would be minimal because of management prescriptions of controlled surface use and NSO in the majority of SMAs (Map 39 and Map 40).

Withdrawal of lands from mineral location under this alternative would have the same impacts on the SMA resources and resource users as that under the No Action Alternative.

The VRM classifications under this alternative would have greater beneficial effects on SMA resources than would those under the No Action Alternative because all SMAs would be classified as either Class I or Class II.

Additions to and expansions of ACECs would significantly benefit the resources within these areas because of the amount of land area and management prescriptions associated with these designations. The proposed expansion of the Greater Sand Dunes ACEC to include the paleosol deposition area would ensure protection of significant geological and archeological components of the study of early human habitation of North America. The proposed expansion of the Steamboat Mountain ACEC to include Indian Gap and the face of Steamboat Mountain would ensure protection of important wildlife habitat, a unique vegetation type, and a significant heritage resource. Designation and management of cushion plant communities as an ACEC and the proposed expansion of the Special Status Plant Species ACEC into the JMH CAP planning area to include BLM-administered land occupied by all Wyoming BLM special status plant species would provide protective measures for these species' propagation and survival. However, the benefits of protection of resources from ACEC expansions would be less than under Alternative 2 because less area would be designated as SMAs and no further evaluation of areas as RNAs would occur.

Management of the Pinnacles Geographic Area would significantly benefit the natural resources within this area. Access to the parcel of state land adjacent to this area would be provided via an existing road; the presence and any future maintenance of this road would not impact the manageability of the Pinnacles Geographic Area. The proposed management action of pursuing land exchanges for improving management of resources and minimizing habitat fragmentation would apply to this parcel of state land, thereby improving the manageability of the area. There are no existing mining claims within the Pinnacles Geographic Area, which would eliminate any impact on the manageability of the area from existing or future claims. No new leases would be offered in the Pinnacles Geographic Area; therefore, the manageability of this area would be compatible with management actions for other resources in the planning area. Activities to support livestock operations, such as water developments and range improvements, would be allowed within the Pinnacles Geographic Area, provided that the construction, use, and maintenance of the facilities were in compliance with the management prescriptions for this area.

4.10.1.6 Proposed JMH CAP

The existing SMAs would continue to be managed to preserve and protect the integrity and character of the specific areas in accordance with ACEC policies and WSA interim management policies. All management actions and resource uses would focus on the protection of the sensitive environmental resources and the health and safety of the user.

Management of land and water resources would not have significant impacts on SMAs. The implementation actions generally limit the extent of surface disturbing activities, vegetation removal, and season of use, providing protection of wildlife habitat and locations of special status plant species. Livestock grazing implementation actions would be evaluated and modified as needed to be consistent

with the management prescriptions of SMAs. These land and water implementation actions generally coincide with the management objectives of SMAs.

Heritage sites, such as White Mountain Petroglyphs, Boars Tusk, Killpecker Sand Dunes, South Pass, and National Historic and National Scenic Trails, are part of or are located within existing SMA boundaries. Managing and protecting these heritage resources, including the protection of related Native American respected places, would not impact the management prescriptions of SMAs. Implementation actions for managing heritage resources would be complementary to SMA objectives.

Managing travel and access throughout the planning area through creation of a transportation plan would have beneficial impacts on SMA resources by identifying and controlling highly traveled routes, providing for orderly development that would be compatible with ACEC and WSA objectives, and providing maximum protection for sensitive resources. The OHV designations would be compatible with SMA management prescriptions. Any impact on the integrity and maintenance of the designated area from surface disturbance or vegetation removal caused by OHVs would be minimal, provided that OHV users adhered to OHV designations.

Land adjustments and exchanges of state lands within WSAs and other SMAs identified in the Green River RMP would be pursued. Acquiring state inholdings would likely result in beneficial impacts on the resources in SMAs because BLM could implement cohesive management prescriptions and avoid fragmentation of these areas.

Management of recreation resources would have beneficial impacts on SMA resources. The WSAs and ACECs are popular recreation destinations; thus, the preparation of recreation site plans and placement of interpretive signs would have beneficial impacts on both the resource and the user. Recreational management actions could have an overall indirect beneficial effect on SMA resources through public education via interpretive materials on the importance of protecting and preserving unique resources. The preparation of recreation project plans for the National Historic Trails, Crookston Ranch, Boars Tusk, and White Mountain Petroglyphs would benefit the users of these resources by providing interpretive materials on historical and cultural sites of interest.

Surface disturbing activities associated with the construction of facilities and linear ROWs for pipelines, transmission lines, communication lines, and oil and gas development could adversely impact SMA resources. These activities could have adverse impacts because they could affect the integrity and continued maintenance of the area as an SMA and would be visually apparent to the users of SMAs. However, with the management prescriptions for SMAs, including the interim management guidelines for WSAs that prohibit impairment, the appropriate actions to meet objectives would be provided and any impact would be insignificant. Furthermore, SMAs could be further protected in Area 3 (Figure A17-1) of the JMH CAP fluid mineral leasing implementation strategy (Appendix 17). The majority of Area 3 would be closed to new oil and gas leasing, which could reduce potential impacts on SMAs in this area. Over the long term, impacts in Area 3 would be minimized because all leases in this area would expire within an 11-year time period.

Withdrawing lands from mineral location and revoking existing withdrawals would affect SMA resources and resource users. The oil shale and coal classification would be revoked, and upon its revocation, all SMAs, with the exception of White Mountain Petroglyphs, the western portion of the Greater Sand Dunes ACEC, special status plant sites, Crookston Ranch, Tri-Territory Marker, and South Pass Summit, would be open for mineral location (Map 53), potentially having an adverse effect on SMA resources. However, a plan of operations would be required and a resource evaluation would be completed for any mining activity within an SMA, thereby minimizing potential impact on the characteristics of the area that support its special designation. The WSAs would be managed as VRM Class I areas to preserve the

natural setting and existing character of the landscape, having a beneficial impact on SMA resources. The interim management policy for WSAs provides for temporary uses and limits surface disturbing activities. This policy, together with the VRM Class I objective, would ensure the preservation of the wilderness characteristics of these areas.

The VRM classifications could have beneficial effects through the protection of viewsheds associated with historic resources, such as South Pass Historic Landscape, and with sites of concern to Native Americans, such as White Mountain Petroglyphs. The VRM Class II designation for these locations, the Steamboat Mountain ACEC, the remaining ACECs, and the area adjacent to WSAs would limit the design and placement of structures to blend in with the landscape. Much of the Red Desert Watershed Management Area would be managed as VRM Class III to retain the existing character of the landscape. These classifications would have a beneficial effect by maintaining the resource integrity for which the areas were designated.

The Pinnacles Geographic Area, including the geologic feature, would be managed as part of the Red Desert Watershed Management Area. The Pinnacles Geologic Feature would be an exclusion area for ROWs, closed to salable mineral activities, and classified as a VRM Class II area. These restrictions would protect resources within this area, preserving unique geologic features from surface disturbing and disruptive activities.

The implementation prescriptions for SMAs would have direct beneficial effects on the resources of those SMAs and thus would indirectly benefit the continued management of these areas as SMAs. As stated above, the potential impacts of implementing these management prescriptions are discussed in the separate resource management categories.

The West Sand Dunes Archaeological District is a significant heritage resource and is eligible for inclusion in the NRHP under Criterion D as a result of the scientific information the area has been demonstrated to possess. Establishment of the West Sand Dunes Archaeological District as an SMA under this alternative focuses attention on management prescriptions intended to protect these scientific values while still allowing activities in the area. The management approach recognizes that the most important scientific information will likely be found in buried soil horizons, sometimes called paleosols, and that traditional surface inventories are not likely to find the most important archeological manifestations. Establishing the SMA also provides some approaches designed to find deposits and guidance for managing important deposits, to preserve or retrieve the scientific information they contain.

4.11 AIR RESOURCES

Air resources managed by the BLM include air pollutant concentrations, visibility, and atmospheric deposition. Air quality is mainly determined by air pollutant emissions, meteorology, and terrain. Air quality impacts are based on federal and state laws and regulations. National Environmental Policy Act (NEPA) and FLPMA require that federal activities not violate federal laws and regulations. The conformity clause of the 1990 amendments to the Clean Air Act further require that federal activities be substantially in conformance with state and local air quality regulations. Air quality in the JMH CAP planning area (and throughout Wyoming) is regulated by the Wyoming Department of Environmental Quality (WDEQ).

4.11.1 Potential Impacts on Air Quality

WDEQ Air Quality Division (AQD) regulates air quality impacts in terms of their potential for exceeding National Ambient Air Quality Standards (NAAQS), federal Prevention of Significant Deterioration (PSD) increments, and Wyoming Ambient Air Quality Standards (WAAQS) as described in Chapter 3 of this

document. Potential impacts would be significant if the NAAQS or WAAQS were exceeded, an existing air quality violation were further aggravated, PSD increments for Class I or Class II areas were exceeded, increased toxin concentrations were above designated thresholds, atmospheric deposition impacts were above terrestrial voluntary guidelines (3–5 kg total nitrogen per hectare/year; 5 kg total sulfur per hectare/year) or above aquatic levels of acceptable change (10 percent change in acid neutralizing capacity), or visibility impacts on sensitive areas were above the designated 0.5 and 1.0 deciview (dv) change threshold. A significant impact on air resources might require mitigation before a permit could be issued by the state.

Air quality modeling of regional impacts was performed in 1999 for the Pinedale Anticline Project in Sublette County. The JMH planning area was included in the impact analysis of this air quality modeling. In examining whether the BLM activities in the JMH planning area would result in the exceedence of any of these air quality standards, it has been assumed that the results of that modeling remain valid. A detailed description of this air quality analysis is given in the Pinedale Anticline Oil and Gas Project Final Environmental Impact Statement and associated documents.

The air quality modeling for the Pinedale Anticline Project included an analysis of emissions from the projected construction, well drilling, and operation of 500 to 700 wells in the Pinedale area. The modeling also included a cumulative analysis of emissions from projected development of 7,211 wells in surrounding areas in the model domain of southwestern Wyoming, north-central Utah, and northwestern Colorado. Impacts were analyzed in terms of local impacts of individual wells or well fields on their immediate vicinity (near-field impacts) and in terms of effects on distant Clean Air Act Class I areas (far-field impacts).

4.11.1.1 Common to All Alternatives

Many land use activities on BLM land result in emissions to the air. Air emissions are associated with oil and gas exploration and production activities for which the BLM leases land and minerals. Vehicles from daily traffic, OHVs, recreationists, hunters, industry, and livestock operators using BLM lands are also air emission sources.

Oil and gas operations result in air emissions associated with site construction, well drilling and completion, and operation of production facilities, including separators, dehydrators, tanks, and compressors. Workover and repair operations could also result in short-term, temporary (fugitive) emissions. The primary pollutants that would be emitted during oil and gas operations include carbon monoxide (CO), volatile organic compounds (VOC), sulfur dioxide (SO_2), nitrogen oxides (NO_X), and particulate matter (PM). Drilling, completion, and repair activities all result in short-term emissions, while emissions associated with operation of production facilities are ongoing throughout the life of a producing well.

Input information for the Pinedale Anticline Project air quality modeling included meteorological data and emission source information throughout the model domain. Simulations were run to evaluate the contribution of existing sources, projected Pinedale Anticline sources (500 to 700 wells and compressors), and cumulative sources (7,211 wells and compressors) in the region. The cumulative impact modeling included existing and reasonably foreseeable new sources. The CALPUFF modeling system was used for the cumulative (far-field) impacts. The model simulations predicted regional concentrations of pollutants and calculated air quality impacts on the sensitive areas (PSD Class I and sensitive Class II areas) throughout the region (Figure A15-13).

Emission rate estimates from the Pinedale Anticline Project included assumptions for projected oil and gas development in the JMH CAP planning area, including emission factors, number of wells, and

horsepower (hp) of compression. In 1999, it was assumed that 110 new wells would be drilled in the JMH CAP planning area and that approximately 3,480 hp of compression (based on 60 hp per producing well) would be used. Only NO_X emissions were calculated for far-field impacts because particulate matter (PM_{10}) and SO_2 were expected to be negligible. The emission factors used were 0.065 tons of NO_X per well per year, for wells, and 1.5 grams NO_X per brake-horsepower hour, for compressors. Except for the number of wells, which is discussed later, these are still considered to be reasonable assumptions.

The model predictions of air quality impacts from the projected Pinedale Anticline sources were significantly less than existing sources for all pollutants. Furthermore, the predicted emissions from cumulative sources were in compliance with the NAAQS and the WAAQS for all pollutants. The projected maximum impact of cumulative sources for annual NO_X emissions was 0.03 micrograms per cubic meter ($\mu g/m^3$), which was less than 1 percent of background concentration (9 mg/m3) and well below the ambient standards (Figure A15-1).

In the Pinedale Anticline cumulative impact analysis, 110 wells and compressors were within the JMH CAP planning area. This is 1.5 percent of the 7,211 total sources. The Hydrocarbon Occurrence and Development Potential Report for the JMH CAP planning area (Appendix 13) projected a maximum of 132 producing wells over the planning period, which would represent a 1.8 percent increase if the cumulative sources were unchanged. Even though it would be reasonable to assume that there are new sources in the model domain since 1999, it is also likely that not all estimated wells or compressors continue to operate. Because the annual NO_X concentration from cumulative sources was determined to be 0.03 $\mu g/m^3$ the difference between 110 and 132 wells in the JMH CAP planning area is unlikely to result in an appreciable change in the concentration. Because the cumulative impacts predicted by the Pinedale Anticline modeling are significantly less than background concentrations, ambient air quality standards, and PSD requirements, and because the changes since 1999 are small, additional air quality modeling to account for the revised Hydrocarbon Occurrence and Development Potential Report for the JMH CAP planning area is not necessary.

The Pinedale Anticline Project modeling also calculated visibility impairment in PSD Class I areas in the model domain. Visibility was estimated in terms of change in deciview from background visibility (this measure of visibility was described in Chapter 3). The model results reported two thresholds of visibility change: days with greater than 1.0 dv change and days with greater than 0.5 dv change. The U.S. Forest Service (USFS) uses 0.5 dv as a threshold of acceptable change in visibility in sensitive areas, whereas a 1.0 dv change is the threshold in the U.S. Environmental Protection Agency (EPA) regional haze regulations. The model results for cumulative emissions predicted that the PSD Class I area nearest to the Pinedale Anticline Project, Bridger Wilderness, would experience 9 days of visibility with a change of greater than 0.5 dv. There were no areas where visibility change exceeded 1.0 dv. As noted above, the model input includes weather data. The visibility results indicated that some of these 9 days of greater than 0.5 dv change in visibility were attributable to meteorological conditions. These preliminary model results suggest that impacts from cumulative emission sources could be significant. However, because emission sources within the JMH CAP planning area represent only 1.8 percent of those analyzed for the Pinedale Anticline, visibility impacts from proposed activities within the JMH CAP planning area are not anticipated to be significant. As noted above, the analysis for the Pinedale Anticline included only 110 wells versus 132 wells for the JMH CAP planning area; however, given the change in pollutant concentrations previously described, the addition of 22 wells would likely have little effect on the visibility modeling results.

The air pollutant emissions used in the above discussion are comparable to those expected from the maximum projected development alternative (Alternative 1) for the JMH CAP planning area. Because no significant impacts on air resources were indicated under this scenario, no significant impacts would be

expected under the lesser development scenarios of the No Action Alternative, Alternative 2, Alternative 3, or the Proposed JMH CAP.

4.12 SOCIOECONOMICS

The socioeconomic analysis focuses on three resource uses of the planning area: livestock grazing, recreation, and oil and gas development. The area of economic influence used for this analysis includes the counties of Sweetwater, Fremont, and Sublette, even though most of the planning area is located within Sweetwater County. The potential impacts discussed under this section are relative to this area of influence.

4.12.1 Significance Criteria

Significance criteria for socioeconomic impacts were determined by analyzing long-term trends and fluctuations for certain important economic variables, including total employment, total earnings, and mineral ad valorem taxes associated with natural gas production. This analysis evaluated the long-term trends to determine the approximate changes likely to occur in these variables under existing conditions. Annual deviations from the trend over this 20-year period are considered the threshold of what can be tolerated by the regional economy for these three variables. Any changes beyond these thresholds would likely have significant impacts on local communities.

Figure 13 summarizes total annual employment for the study area between 1979 and 1999 and shows that total employment followed a slightly increasing trend (5 percent) during the study period. The trend analysis also shows that the regional economy has experienced cyclical fluctuations in employment. Therefore, although total employment increased over time, it is reasonable to assume that in any given year, total employment may have deviated by 10 percent above the trend to 12 percent below the trend (+4,600 jobs to –5,400 jobs). The error bars on the graph show a 10 percent confidence interval for each data point.

Deviations in total employment, as measured by the historical trend, were used to define the threshold of significance for this analysis. Thus, if employment impacts due to changes in management associated with the JMH CAP planning area did not exceed an increase or decrease of 5 percent of the trend, the impact would not be considered significant. But it should be noted that the threshold for determining significance was reduced by at least 50 percent from the observed historical trend to ensure that fluctuations in employment resulting from management actions were carefully examined.

A similar analysis was performed on total earnings. Figure 14 summarizes the trend in real earnings for the study area between 1979 and 1999. Total earnings in the study area averaged $1.4 billion per year between 1979 and 1999 in inflation-adjusted dollars. During this time, total earnings followed a declining trend, falling by 8 percent. In addition to experiencing an overall decline in total earnings, the area has endured cyclical fluctuations in total real earnings ranging from 8 percent above the trend to 13 percent below the trend. Given this trend, the threshold of significance for total earnings was determined to be +/–3 percent of the trend (+/–$35 million).

The historic trend associated with mineral ad valorem taxes for gas production for the study area is summarized in Figure 15. The graph shows the estimated value in inflation-adjusted dollars of ad valorem taxes associated with gas production. During this time (1985–2000), ad valorem taxes fluctuated substantially from the trend (–$14 million to +$10 million). Given the importance of mineral ad valorem taxes to local government entities and the fluctuating nature of gas production and prices, the significance threshold for this variable was decreased to 5 percent above or below the trend (+/–$5 million).

4.12.2 Analysis Methods

The potential economic impacts of alternatives associated with the JMH CAP planning area were estimated using an input-output (I/O) model developed for southwest Wyoming by the University of Wyoming. I/O modeling is a mathematical accounting of the flow of dollars and commodities through a region's economy. These types of models provide estimates of how a given amount of a particular economic activity translates into jobs and income in the region.

4.12.2.1 Data Sources

The I/O model used for the JMH analysis was an updated version of the model developed for the Southwest Wyoming Resource Evaluation Report. The model uses 1996 data for Lincoln, Sublette, Sweetwater, and Uinta Counties. Although this model does not include Fremont County, this county's economy is very similar to the economic characteristics included in the model. Therefore, the model should provide a reasonable estimate of the structure of the economy for the study area. The I/O model predicts aggregate changes in employment and earnings across all counties in the study area. It is not possible to predict where these impacts would occur within each of the counties.

There may be certain businesses in Fremont County that are not represented in Sublette and Sweetwater Counties. For example, Fremont County has a livestock auction and certain implement dealers that serve ranchers using the JMH area. Although this consideration presents a challenge in using the Southwest Wyoming I/O model for this analysis, it was not considered a fatal flaw because expenditures associated with livestock auctions and implement dealers, made by ranchers using the JMH CAP planning area, are quite small relative to the agriculture sector in the area. Therefore it was determined that adding Fremont County to the model would not produce significantly different results (i.e., benefits) that would outweigh the costs of such an exercise.

All data used with the Wyoming I/O model were adjusted for inflation and converted to 1996 dollars before model runs were completed. After completion of the model runs, dollar values were converted to constant 2001 dollars for the 20-year study period (2003–2021) and discounted using a 7 percent real discount rate, as recommended by the Office of Management and Budget (OMB). The OMB recommendation for using a real discount rate of 7 percent for constant-dollar benefit-cost analysis, approximates the marginal pretax rate of return on an average investment in the private sector in recent years.

The Wyoming I/O model requires a series of inputs and assumptions specific to the study area. This includes the value of production resulting from land uses within JMH under each alternative. Interviews were conducted with BLM staff and cooperating agency partners to obtain information on current uses and how these uses might change under each alternative. This provided a physical quantitative measure of inputs necessary for the economic impact analysis (e.g., number of gas wells, AUMs, recreational visitor days.). Table 4-13 summarizes the primary data and sources used to estimate physical inputs for the I/O model.

Table 4-13. Economic Model Inputs

Use	Primary Data Inputs	Data Source
Oil and Gas Exploration and Development	• Historic production • Historic and forecasted prices • Development cost estimates • Hydrocarbon Occurrence and Development Report	• Wyoming Geological Survey • U.S. Department of Energy • Interviews with local oil and gas companies • BLM
Grazing	• Historic AUMs for cattle and sheep within JMH • Historic cattle and sheep prices (1996–2001)	• BLM • Wyoming Agriculture Statistics
Recreation	• Estimated recreation visitor days per recreational activity • Estimated recreational expenditures per activity	• BLM–RMIS Database • Wyoming Game and Fish • Wyoming Tourism Board • Colorado Off-Highway Vehicle Coalition

The estimates of inputs, including prices, were used to evaluate the potential sales from uses of the JMH CAP planning area under each alternative. This is the direct sales estimate that serves as the input into the Southwest Wyoming I/O model to obtain an estimate of total economic impact for each alternative (changes in direct, indirect, and induced income and employment). Further details on the economic impact analysis are provided in Appendix 16.

4.12.2.2 Alternatives Assumptions

The management prescriptions under each alternative could impact the uses within JMH. The estimate of socioeconomic impacts for these management prescriptions required a series of assumptions regarding future uses under each alternative. The following subsections discuss the assumptions used for this analysis.

Oil and Gas Development

An estimate of future oil and gas exploration and development was taken from the Hydrocarbon Occurrence and Development Report. Table 4-14 summarizes the total well estimates for each alternative taken from this report. Oil and gas exploration and development would be expected to increase from current conditions. This includes the conventional wells listed in Table 4-14 in addition to 25 to 50 coalbed gas development wells to be drilled under the various alternatives. Alternative 1 would allow the greatest potential for oil and gas exploration and development relative to the No Action Alternative, whereas Alternative 2 would be the most restrictive to this activity and provide the opportunity for BLM to purchase existing leases from, or exchange existing leases with, willing leaseholders in areas that should be closed to leasing for protection of sensitive resources (Appendix 16). It is assumed that under Alternative 2 special legislation from Congress authorizing the purchase or exchange of leases would be in place. The Proposed JMH CAP has the same controls on leasing and development rates as Alternative 3 and would have similar development levels and impacts.

Table 4-14. Estimated Oil and Gas Development for JMH

Alternative	Exploration Wells	Development Wells	Well Total	New Producing Wells
1	156	108	264	132
2	86	77	163	90
3	115	90	205	107
No Action	126	95	221	114
Proposed JMH CAP	115	90	205	107

Grazing

The 5-year historic average was used as a basis in developing the grazing assumptions used under each alternative. Grazing use was assumed to remain near the 5-year historic average of 11,602 AUMs (10,649 cattle and 953 sheep) except under Alternative 1, where it was assumed that grazing use would gradually increase during the study period to the fully permitted active use of 26,830 AUMs (23,627 cattle and 3,203 sheep).

Permittees have the opportunity to increase grazing use to fully permitted active use, but during the past 5 years grazing has averaged about half this permitted use. Historic use was likely impacted by a variety of factors, including weather and range condition in addition to changing economic factors that affected the ability of ranchers to use their allotted AUMs in any given year. Economic factors include fluctuating cattle prices, changes in interest rates, cost changes associated with farm machinery and supplies, import-export polices, and changes in consumer demand for beef and beef substitutes. Although permittees could use their full preference under any alternative if the Wyoming Standards for Healthy Rangelands (Appendix 10) are met, the assumption of increasing grazing use under Alternative 1 was for analysis purposes only.

The wildlife objectives proposed by WGFD for herd units that encompass the JMH CAP planning area could also impact grazing use during the study period. The elk herd objective for JMH has increased to 1,200 from the old objective of 500. This could affect the availability of forage for domestic livestock and make the possibility of increasing AUM use to fully permitted amounts less likely over the 20-year study period.

Recreation

Recreational use by alternative was estimated with a series of assumptions. These assumptions drive the changes in recreation associated with elk and greater sage-grouse hunting. Elk hunting is expected to increase, following recent hunting trends and assumptions on elk dispersion and access, under Alternatives 1 and 3 for the first part of the study period. Under the No Action Alternative, Alternative 1, and Alternative 3, greater sage-grouse hunting is expected to decline during the first part of the study period and then be eliminated as populations continue to decline. Greater sage-grouse hunting is expected to remain constant at current levels under Alternative 2. Recreational use associated with antelope and mule deer hunting was assumed to stay constant at the 5-year historic average for all alternatives.

The estimated recreation visitor days (RVD) associated with hunting deserve some additional discussion. Although management actions are aimed at managing herd units that are important for hunting, these actions may or may not affect the number of hunting days spent in the JMH CAP planning area. A management action that causes herd numbers to decline may actually increase the number of hunting days spent in the area (i.e., hunters spend more days hunting fewer animals). Thus, there may be a weak

correlation between management actions that would increase or decrease herds and the number of hunting days actually spent in JMH.

OHV use would be expected to increase by 2.5 percent per year for the first half of the study period for the No Action Alternative and the Proposed JMH CAP because of improvements proposed for the Sand Dunes Recreation Area and increased interest in the planning area. However, OHV use would not be expected to follow this trend during the later part of the study period under these alternatives. Under Alternatives 2 and 3, OHV use would be expected to remain constant at the 3-year historic average or begin to decline because of access limitations and no proposed improvements to the Sand Dunes Recreation Area. Other recreational uses would be expected to increase between 1 and 2 percent per year under the various alternatives based on the prescribed management action. Further discussion of the recreational assumptions used for this analysis is provided in Appendix 16.

4.12.3 Impacts Common to All Alternatives

Under all alternatives, increased development activities are expected to generate economic benefits to the local communities near JMH. Most benefits would be the result of increased oil and gas development, although continued benefits would be realized through grazing and recreational activities. All activities are expected to support on average more than 120 jobs per year.

Although the modeling efforts do not indicate where the employment impacts would occur, it can be deduced that they would be focused in Sweetwater County, within the location of larger population centers like Rock Springs and Green River. Although the analysis shows an increase in the number of jobs supported by activities within JMH under all alternatives, it is not expected that these activities would create a boom type situation in these communities, such as occurred during the mid-1970s. This is because the expected employment supported by activities within JMH would be a combination of new jobs and the support of existing jobs in the local area. Therefore, although employment would likely increase under all alternatives, it is not expected to increase to the full estimate of average employment and thus would not cause significant changes in population for communities such as Rock Springs and Green River.

Potential earnings are also expected to increase under all alternatives during the 20-year study period because of gas development, grazing, and recreation in JMH, with gas accounting for more than 90 percent of total earnings under all alternatives. On an annual basis, total real earnings would increase by between $2.4 million and $3.3 million under the various alternatives. This equates to less than 1 percent of total real earnings in the study area for 1999 and is thus not considered significant.

Increased gas production within JMH will provide a positive fiscal impact to local communities in the form of increased mineral tax revenues. This includes federal mineral royalties, state severance taxes, and ad valorem taxes on production collected by the counties. Mineral tax revenues are estimated to increase by between $85 million and $114 million over the 20-year study period as a result of increased gas production in JMH. Although local government entities benefit from the mineral tax revenues collected on gas production within the JMH CAP planning area, the greatest impact would be due to increases in ad valorem taxes that are collected by the counties.

It is unknown what the gas production levels would be in the study area over the next 20 years. For comparison purposes, average production in the three-county area was assumed to follow historic production trends over the past 20 years. If gas production follows a similar trend, expected ad valorem taxes associated with production in JMH could account for approximately 3 to 4 percent of average ad valorem taxes associated with gas production in the study area. It is likely that most of this impact would occur in Sweetwater County, given the location of the planning area and drilling activities. Sweetwater

County, on average, has realized an estimated $18 million per year (1996$) in ad valorem taxes through gas production between 1985 and 2001. Assuming that gas production could be sustained at similar levels over the next 20 years, potential ad valorem taxes associated with production in JMH could account for approximately 6 to 8 percent of average ad valorem taxes on gas production in Sweetwater County, providing an important economic benefit to this area.

4.12.4 Potential Impacts on Employment

Potential impacts on employment are summarized in Figure 16 (see page F-11). The average annual employment supported by activities in JMH would range from 129 jobs per year under Alternative 2 to 187 jobs per year under Alternative 1. The figures indicate the dependence of jobs associated with oil and gas development for all alternatives.

4.12.4.1 No Action Alternative

Under the No Action Alternative, the average annual employment supported by activities in the JMH CAP planning area would approach 160 jobs. This accounts for less than 1 percent of total employment in the study area in 1999.

4.12.4.2 Alternative 1

Alternative 1 would have the greatest potential for increased employment of any alternative, representing a 15 percent increase from the No Action Alternative. Average annual employment supported by activities under Alternative 1 would be estimated to reach 187 jobs, with more than 80 percent of this employment occurring in the oil and gas industry. However, employment impacts would not be considered significant because Alternative 1 would be expected to support only 27 more jobs per year than the No Action Alternative. This increase in employment under Alternative 1 would be well below the established employment threshold (+4,600 jobs to –5,400 jobs) and thus would be considered insignificant for the regional economy.

4.12.4.3 Alternative 2

Alternative 2 would be expected to support, on average, 129 jobs per year. The reduction of 33 jobs per year, on average relative to the No Action Alternative would not be considered significant relative to threshold values.

4.12.4.4 Alternative 3

Annual employment supported by activities under Alternative 3 would be expected to average 151 jobs per year, which would be 11 jobs fewer than under the No Action Alternative. The decline in potential employment growth under this alternative would not be considered a significant impact when compared to threshold values.

4.12.4.5 Proposed JMH CAP

Annual employment supported by activities within JMH under the Proposed JMH CAP is estimated to average 153 jobs per year. This represents roughly nine fewer jobs supported relative to the No Action Alternative. The reduction in potential job growth caused by this alternative is not considered significant.

4.12.5 Potential Impacts on Earnings

The results shown in Figure 17 (see page F-12) represent the increase in potential earnings over the 20-year study period resulting from gas development, grazing, and recreation in JMH under each alternative. Gas development accounts for more than 90 percent of total earnings under each alternative.

4.12.5.1 No Action Alternative

Real earnings would likely increase under the No Action Alternative, largely because of the expected increase in oil and gas development. It was estimated that over the 20-year study period, activities in the JMH CAP planning area would generate $58 million in total real earnings for the regional economy. On an annual basis, total real earnings would average $2.9 million per year. This equates to less than 1 percent of total real earnings in the study area for 1999.

4.12.5.2 Alternative 1

Potential increases in total real earnings would be greatest under Alternative 1, which provides for the greatest potential for oil and gas development. Total earnings were estimated at $66 million over the 20-year study. However, the economic impacts associated with Alternative 1 would not be considered significant relative to the threshold values. Total earnings under Alternative 1 would average $3.3 million per year, which would be a 13 percent increase from the No Action Alternative, or $387,000 per year. The annual increase in earnings attributable to Alternative 1 would be well below the significance criteria (+/–$35 million) and would thus not be considered a significant impact for the regional economy.

4.12.5.3 Alternative 2

Alternative 2 would have the lowest potential for development of any alternative and thus would be expected to generate the lowest potential for increased real earnings of any alternative. Total earnings would be expected to increase, but at a reduced rate from the No Action Alternative. During the 20-year study period, total earnings would be estimated to increase by $48 million, which would be 17 percent lower than under the No Action Alternative. On average, total earnings would likely increase by $2.4 million per year, which would be $495,000 lower than under the No Action Alternative. However, this reduction in earnings would not be considered significant because the difference falls well within the threshold values.

4.12.5.4 Alternative 3

Alternative 3 would have the potential to provide $55 million in total earnings during the 20-year study period, which would be 5 percent less than the No Action Alternative would provide. On average, total earnings would increase $2.8 million per year, which would be $132,000 lower than under the No Action Alternative. However, this impact would not be considered significant because it would be well within the established threshold for changes in earnings for the regional economy.

4.12.5.5 Proposed JMH CAP

The Proposed JMH CAP has the potential to provide $55.5 million in total earnings during the 20-year study period. Potential earnings due to this alternative are 4 percent lower than those under the No Action Alternative. On average, total earnings would increase $2.8 million per year, which would be $115,000 lower than under the No Action Alternative. However, this impact would not be considered significant because it would be well within the established threshold for changes in earnings for the regional economy.

4.12.6 Potential Fiscal Impacts

Given the importance of mineral tax revenues to local and state government entities in Wyoming, the analysis also considered changes in potential mineral revenues under each alternative. Table 4-15 shows the present value of total mineral revenues received as a result of gas production from 2003 to 2022. This includes federal mineral royalties, state severance taxes, and ad valorem taxes on production collected by the counties.

Table 4-15. Total[a] Estimated Mineral Royalties and Taxes from JMH[b] (2001 dollars)

Alternative	Ad Valorem	Severance	Federal Royalties	Total Mineral Revenues
Alternative 1	$28,036,652	$26,514,289	$59,620,326	$114,171,267
Alternative 2	$20,990,289	$19,850,538	$44,636,140	$85,476,967
Alternative 3	$24,010,141	$22,706,414	$51,057,895	$97,774,450
No Action	$25,016,779	$23,658,393	$53,198,526	$101,873,699
Proposed JMH CAP	$24,010,141	$22,706,414	$51,057,895	$97,774,450

[a]Total amount for 20-year study period.
[b]This table summarizes the net present value of estimated mineral royalties and taxes by alternative. Royalties and taxes have been discounted using a real discount rate of 7 percent as recommended by OMB.

Although local government entities benefit from the mineral tax revenues collected on gas production within the JMH CAP planning area, the greatest impact would be due to changes in ad valorem taxes that are collected by the counties. Local governments within the study area receive only a percentage of federal royalties and severance taxes collected on production originating on public lands. Figure 18 (see page F-12) shows the ad valorem taxes resulting each year from potential gas production in JMH. It indicates that ad valorem taxes would be greatest for each alternative in 2006, when gas production is projected to be the highest.

4.12.6.1 No Action Alternative

Additional gas development would have the potential to increase mineral revenues to federal, state, and local government entities by $102 million over the 20-year study period. This would include additional mineral ad valorem taxes to the counties, which would average $1.2 million per year, with a high of $2.9 million in inflation-adjusted dollars during 2006.

4.12.6.2 Alternative 1

Mineral tax revenues would be expected to be greatest under Alternative 1 because of increased gas production, and might exceed $114 million over the 20-year study period. Ad valorem taxes would be expected to be $1.4 million per year, with a high of $3.1 million in 2006. Impacts on mineral revenues would be considered insignificant relative to the significance criteria (+/–$5 million). Increases in mineral ad valorem revenues would be expected to be 12 percent over the No Action Alternative, or $151,000 per year. The maximum amount of ad valorem taxes anticipated from production in JMH would be in 2006, approximately $196,000 higher under this alternative than under the No Action Alternative. This increase would be well within the established thresholds and thus not considered a significant impact on the counties.

4.12.6.3 Alternative 2

Mineral tax revenues would be expected to total $85 million over the 20-year study period. This includes almost $21 million in ad valorem taxes that would go directly to the counties in the study area. Ad valorem taxes would be estimated at $1.1 million per year, which represents a 9 percent decrease from the No Action Alternative, or approximately $100,000 per year. This impact would not be considered significant because it would be well within the established threshold for mineral ad valorem taxes at +$5 million to –$5 million.

4.12.6.4 Alternative 3

Total mineral revenues would be estimated to total $98 million over the 20-year study period. This would include $24 million in ad valorem taxes. Gas production would provide $1.2 million per year in ad valorem taxes to local counties, which would be approximately $50,000 lower than the No Action Alternative. Although mineral ad valorem taxes would be expected to be lower under this alternative relative to the No Action Alternative, the impact would not be considered significant according to the established thresholds for this area.

4.12.6.5 Proposed JMH CAP

Mineral revenues under the Proposed JMH CAP are estimated to total $98 million over the 20-year study period, including $24 million in ad valorem taxes. On average, gas production would provide $1.2 million per year in ad valorem taxes to local counties, which would be approximately $50,000 lower than under the No Action Alternative. Although mineral ad valorem taxes would be expected to be lower under this alternative relative to the No Action Alternative, the impact would not be considered significant according to the established thresholds for this area.

4.13 CUMULATIVE IMPACTS

Cumulative impacts can result from individually minor but collectively significant actions. The Council on Environmental Quality describes cumulative impacts as follows:

> *"…the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time"* (40 CFR 1500-1508).

Cumulative impacts are discussed because the quality of the human environment is the result of many different factors acting together. The real effect of any single action cannot be determined by considering that action in isolation, but must be determined by considering the likely result of that action when acting in conjunction with many others.

The cumulative impact analysis for this EIS evaluates the potential impacts associated with the JMH CAP management alternatives, in combination with the potential impacts associated with other relevant activities that have occurred, are occurring, or may occur in the vicinity of the JMH CAP planning area. After review of available information, the following types of activities have been identified as having the highest likelihood of generating potential cumulative impacts when added to activities associated with the JMH CAP management alternatives:

- BLM land management plans and activities outside the JMH CAP planning area boundary

- Regional oil and gas development activities (e.g., exploration, production, and pipeline development)
- Regional recreation activities (e.g., big game hunting, OHV) use, dispersed recreation)
- Economic development activities in Fremont, Sublette, and Sweetwater Counties
- Activities within the Green River, Sweetwater River, and Great Divide Basins.

The potential cumulative impacts are described for each potentially affected resource within a defined cumulative impact analysis area (CIAA). The CIAAs cover different geographic areas depending on the specific resource being evaluated. Evaluation of potential impacts considers incremental impacts that could occur from the proposed project, while also considering impacts from past, present and reasonably foreseeable actions (RFA) within each of the CIAAs. RFAs are those future action activities that have been committed to or that are known proposals that could take place within the 20-year planning period.

The CIAAs are described in each of the resource sections below and are shown by Maps 73 through 87. CIAAs are larger for resources that are mobile or migrate than they are for resources that are stationary. For example, the CIAA for big game is based on herd unit boundaries that contain habitats that support individual herds year-round. The air quality CIAA is extremely large because it is based on the complex interaction between climatic factors, terrain, and the potential for significant impacts in sensitive areas within the airshed. Smaller CIAAs were established for resources that are stationary, such as fire, minerals, recreation, and visual resources. In some cases, these CIAAs may follow the JMH CAP planning area boundaries.

Activities and development that occur within the CIAAs (including JMH CAP activities) have the potential to generate cumulative impacts on the specific resource being analyzed. Maps 73 and 74 show existing and reasonably foreseeable oil and gas development projects that could fall within the various CIAAs. These projects are also listed in Table 4-16, along with the number of producing wells and remaining wells that could still be developed for each of the projects should development reach the ultimate level analyzed in the appropriate NEPA document for southwestern Wyoming. These numbers represent potential development, based on the NEPA-approved totals. It is likely that these projects would not actually drill all the wells that were approved. According to the Green River RMP and Final EIS, many existing wells will cease to produce based on historic records, and more than 70 percent of existing wells will be plugged and abandoned by year 2010. However, it is anticipated that these will be replaced by new wells. Other RFAs that could cause cumulative impacts are listed in Table 4-17.

Table 4-16. Summary of Oil and Gas Development Projects Previously or Currently Being Analyzed Under NEPA in Southwestern Wyoming

Project	Date ROD/DR Signed	Producing Wells	Remaining Wells That Can Still Be Drilled
Riley Ridge	1/25/84	23	224
Burley	6/7/94	31	16
Jonah II Field	4/27/98	129	321
La Barge Coordinated Activity Plan Area	8/16/91	1,135	445
Soda Unit	4/12/89	3	18
Castle Creek	10/24/83	8	10
Moxa Arch	3/7/97	947	1,227
Hickey Mountain	5/13/87	26	50
Road Hollow	9/83	4	6
Fontenelle	8/16/96	1,052	1,141
Stagecoach	9/27/95	9	59

Project	Date ROD/DR Signed	Producing Wells	Remaining Wells That Can Still Be Drilled
East LaBarge	5/29/92	19	9
Bird Canyon	6/25/93	6	8
Bravo Unit	7/20/95	7	4
Mulligan Draw	9/23/92	17	23
Creston Blue Gap	10/4/94	234	175
Dripping Rock/Cedar Break	4/3/85	24	34
Sierra Madre	9/21/87	30	16
Hay Reservoir	6/24/92	40	2
Jack Morrow Hills	Pending	46	205
Continental Divide/Greater Wamsutter	7/20/95	328	2,685
Pinedale Anticline	7/27/2000	85	616
South Baggs	Pending	6	90
Bitter Creek Shallow Gas Project Area	Pending	14	0
Pacific Rim Shallow Gas	Pending	0	150
Copper Ridge	Pending	0	89
Vermillion Basin	8/15/02	0	56
Jonah Infill	Pending	0	1,250
Desolation Flats	Pending	0	385
South Piney	Pending	0	210
Lower Bush Creek	Pending	0	22
Seminoe Road	Pending	0	1,240
Atlantic Rim	7/26/02 6/26/02	0	2,000
Wolverine/Shell		0	1
Little Monument	Pending	0	31
Total		**4,233**	**12,818**

Table 4-17. Summary of Reasonably Foreseeable Actions

Project Title	Project Description
Wind Energy Towers	Six towers to provide meteorological information, with one tower on White Mountain.
Bridger Coal Company, Coal Lease-by-Application	Conversion of surface mining operations to underground mining in order to extend the life of the mine.
Hay Reservoir Geophysical Project	The south boundary of the proposed project lies approximately 20 miles north of I-80. It extends northward past Hay Reservoir and ends 3 miles north of Five Fingers Butte. Approximately 55% of the project area would lie in the Rock Springs Field Office, and 45% of the project would lie in the Rawlins Field Office.
Monell CO2 Pipeline Project	Proposed CO2 pipeline-related facilities along an existing pipeline from the Exxon/Mobil Shute Creek CO2 pipeline system in Sweetwater County, Wyoming, to the existing Monell Federal Unit. Proposed facilities include metering equipment, a booster station, and cathodic protection.
PacifiCorp—Point of Rocks to Rock Springs Transmission Powerline Project	Project is completed.

Project Title	Project Description
Jim Bridger Flue Pond Expansion Project	Project is completed.
South Jonah Geophysical Project	Geophysical operations using vibroseis method to collect subsurface data on 400 square miles of public land.
Quantum Geophysical Project	Project is completed.
Pacific Creek Temporary Surface Pipeline	Project is on hold.
Haystacks Geophysical Project	Geophysical operations in the Haystacks area. The project has been completed, with the exception of minor cleanup planned for spring 2004.
Wolverine Exploratory Drilling Proposal	Three exploratory wells north of Highway 28 in Sweetwater County. Two have been drilled.
Fall and Late Winter Gathering of Wild Horses	The Rock Springs Field Office is proposing to gather and remove excess wild horses in the Great Divide Basin Wild Horse HMA during the time period of February 15 to March 31, 2004.
Pioneer Pipeline Right-of-Way	Pioneer Pipeline has built a 12- to16-inch refined petroleum pipeline across federal lands in southwest Wyoming. The pipeline extends from Sinclair, Wyoming, west to an existing block valve in Croydon, Utah.
FMC's Proposed Haul Road	The modified proposal consists of a paved haul road, six pipelines, and 1 fiber-optic line from the Westvaco mine/plant site to the Granger plant site. FMC is requesting a 400-foot width for construction with a 200-foot width during operations with certain exceptions (i.e., cut and fill areas), and two bridges (cross over Union Pacific Railroad tracks and the Black's Fork River).

Table 4-17. Summary of Reasonably Foreseeable Actions (Continued)

Project Title	Project Description
Veritas DGC Land Incorporated LaBarge 3D Geophysical Project	The proposed LaBarge 3D project would be located west of LaBarge, Wyoming, in portions of Sublette and Lincoln Counties. The general project boundaries would be LaBarge Creek on the south, South Piney Creek on the north, the Calpet Highway (State Highway 235 and Sublette County Road 134) on the east, and the BLM-U.S. Forest Service boundary on the west.
Eden/Farson Irrigation Project	Furnishes an irrigation water supply for 17,010 acres in the vicinity of the towns of Farson and Eden in southwestern Wyoming. Project features include improvements to and maintenance of the reservoirs and drainage systems.
Riparian Exclosures Along the Big Sandy River, Little Sandy River, Pacific Creek, Jack Morrow Creek, and Rock Cabin Creek	Designed to enhance riparian plant communities and fishery habitats as mitigation for sheep to cattle conversions.
Bone Draw Project	Designed to increase game fish populations in the Big Sandy River.
Big Sandy Rock Sill Project	Provides artificial habitat for increasing fish populations.

4.13.1 Land and Water Resources

The land and water resource management category encompasses biological and hydrologic resources and the users and land use programs related to those resources. The significance criteria and analysis assumptions are described within each subcategory.

4.13.1.1 Fire

The CIAA used to analyze cumulative impacts on the JMH fire management program is limited to the JMH CAP planning area. Due to noncontinuous fuels, low historic fire incidence, and significant fuel breaks (e.g., highways, farmland, and county roads), fire management activities within the JMH CAP planning area would be specific to the area and would not be significantly influenced by activities occurring outside the planning area. Therefore, a description of cumulative impacts can be drawn from the analysis, presented previously in this chapter, of the impacts on the fire program resulting from other resource programs within the JMH CAP planning area. The discussion below summarizes the cumulative impact on the fire program resulting from management actions prescribed for the entire JMH CAP planning area.

Cumulative impacts on fire management are not expected to be significant. Such cumulative impacts would occur as a result of the increased development and recreation activities occurring within the planning area. As recreation, mineral development, and other construction activities (e.g., power lines and pipelines) increase as a whole over the planning area, so do the potential for wildfire occurrence and the need for fire suppression activities, which results in increased costs to the fire management program. With increased development and attendant infrastructure (power lines, compressors, pipelines, fuel tanks, etc.) comes a corresponding increase in the potential for fire suppression within the wildland-urban interface (WUI). Suppression activities within WUI areas can be more dangerous, time-consuming, and expensive than suppression in undeveloped areas. Particularly critical would be the extra caution required for firefighter safety within an active gas field. Fire management costs would increase substantially because of increased fire frequency, the additional planning and effort required for fire suppression within WUI areas, and the increased value of developed sites compared with undeveloped rangeland.

Cumulative impacts would be greatest under Alternative 1 because of anticipated increases in development activities and access. Under Alternative 2, restrictions on development and access would reduce the potential for human-caused wildfires and WUI situations, thereby minimizing cumulative impacts on fire management. Cumulative impacts under Alternative 3 and the Proposed JMH CAP would be slightly greater than under Alternative 2 because of fewer restrictions on development and access.

4.13.1.2 Water Resources

The CIAA used to analyze cumulative impacts on watershed resources and water quality extends outside the JMH CAP planning area, following sixth order watershed (12 digit) boundaries (Map 75). Major watershed boundaries within the JMH CAP planning area can be found on Map 61, Water Resources and Watersheds. The CIAA is composed of sixth order watersheds that completely or partially overlap the JMH CAP planning area. In addition to these watersheds, four drainages extending outside of the planning area were considered: Pacific Creek, Killpecker Creek, Sweetwater River, and the multiple drainages of the Red Desert. For Pacific Creek, it was assumed that beyond the confluence between the Green River and the Big Sandy, dilution by the Green River would render any influences undetectable. For Sweetwater River, the area of detectable influence was assumed to extend to the confluence of Alkali Creek, which corresponds with the fifth order (10 digit) hydrologic unit confluence. For the purposes of this analysis, detectable influences within the Killpecker Watershed were assumed to extend within the main channel of Killpecker Creek to the confluence with Bitter Creek, but would most likely be undetectable at that point in all but the most extreme situations of combined disturbance and flow, given the ephemeral nature of the channel. Influences within the hydrologically closed Great Divide Basin were assumed to extend to the lowest elevations within the basin. The sixth order watersheds and the abovementioned four drainages were used as the basic unit of analysis because impacts from management actions proposed under the Proposed JMH CAP and other existing activity plans are not expected to have cumulative hydrologic influence beyond this scale. Given that hydrologic influence is primarily focused in the stream channels and that delineation of the CIAA was based on watershed boundaries, the area of analysis is more than sufficient.

Irrigation diversions will continue to have a noticeable influence on channel dynamics and morphology. Pacific Creek, the primary stream system in the JMH CAP planning area, has been under the influence of irrigation diversions for close to 100 years. Irrigation diversions will most likely continue to be a noticeable influence in the future.

Development projects and other activities that have been mitigated to the level of no significant impact are also assumed to have no significant impact on the cumulative impact area. Although not significant, cumulative impacts would occur from all activities within the area of influence that disturb vegetation or cause soil compaction or channel overland flows, such as road and well pad construction, livestock trampling, and recreational use (especially OHV activity). Such disturbances result in accelerated soil erosion and runoff, which increase sediment and nutrient loads to local channels and lead to channel destabilization. Mineral development and livestock grazing activities would also result in water depletions to the Colorado River and Platte River drainages. This could change the nature of flows, which could alter stream dynamics and cause overall degradation of the riparian corridor (see Section 4.13.1.6 for further details).

Recreation activities are expected to increase within the JMH CAP planning area, and development activities are expected to increase throughout the CIAA, with reasonable foreseeable development of approximately 290 wells (see Table 4-16). Oil and gas projects that are located entirely or partially within the CIAA, and therefore will have cumulative impacts on watershed resources, include Lower Bush Creek, Bravo, Cedar Canyon, Stagecoach Draw, and Jack Morrow Hills (Map 73 and Map 74).

Appropriate mitigation and project design during site-specific analysis could minimize offsite sedimentation but would be dependent on design and maintenance.

Effects on groundwater quality would depend on the quality and maintenance of wells and the overall level of activity. Improper casing and cementing of wells, undetected spills, or leachate from produced water or mud pits could introduce contaminants into the groundwater. Existing development combined with reasonably foreseeable development would increase the potential for such impacts.

Cumulative impacts would be greatest under Alternative 1 because of anticipated increases in development and livestock grazing, as well as fewer restrictions on such activity. Under Alternative 2, increased restrictions on development, recreation, and livestock grazing would reduce the potential for surface disturbance and vegetation removal and any subsequent increases in erosion, runoff, and sedimentation of surface waters. Cumulative impacts under Alternative 3 and the Proposed JMH CAP would be slightly greater than under Alternative 2 because of fewer restrictions on development and recreation activities.

4.13.1.3 Wild Horses

The CIAA used to analyze cumulative impacts on wild horses includes the entire Divide Basin Wild Horse HMA, which extends southeast of the JMH CAP planning area (Map 76). The Divide Basin wild horse herd is managed to the boundaries of the HMA, and therefore could be affected by activities occurring in this area.

Cumulative impacts would occur from a combination of activities and uses occurring within the CIAA. Map 73 and Map 74 show considerable existing and future oil and gas development projects within the southern portion of the HMA. Increasing development and recreation activities, along with livestock grazing and existing wildlife, would cause soil disturbances, remove vegetation, degrade and reduce available forage, and disturb and displace wild horses. These impacts are not anticipated to be significant, given the adaptability of wild horses and the limited amount of vegetation actually removed by development activities. Impacts stemming from competition between livestock and wildlife for forage resources are expected to be mitigated by WGFD efforts to manage and control wildlife populations and by implementation of the Wyoming Standards for Healthy Rangelands.

Cumulative impacts on wild horse management would also result from the need to continually remove wild horses from outside the HMA. Currently, wild horses use habitat outside the established HMA boundaries. Total removal of these wild horses is not possible because other horses will move into these areas as horses are removed. These “outside HMA” horses will not count toward the AML for the Divide Basin Wild Horse HMA, and the need to completely remove them will continue.

Cumulative impacts would likely be greatest under Alternative 1 because of anticipated increases in development and livestock grazing, as well as fewer restrictions on such activity. Under Alternative 2, increased restrictions on development, recreation, and livestock grazing would reduce the potential for surface disturbance and vegetation removal. However, the proposal to reduce the size of the HMA under this alternative could create additional cumulative impacts if the concentration of wild horses in a smaller area caused overuse of available forage and water resources. Cumulative impacts under Alternative 3 would be similar to those under Alternative 2. Although expansion of the HMA under Alternative 3 could reduce cumulative impacts by providing additional habitat and forage for wild horses, fewer restrictions on development and recreation activities under this alternative could partially offset this benefit. Cumulative impacts under the Proposed JMH CAP would be slightly greater than under Alternative 2 or 3 because fewer restrictions on development and recreation activities would be implemented and because the HMA boundaries would not be expanded.

4.13.1.4 Livestock Grazing

The CIAA used to analyze cumulative impacts on livestock grazing includes all allotments that either entirely or partially overlap the JMH CAP planning area (Map 77). Livestock is managed to the boundaries of these allotments, and therefore could be affected by activities occurring in these areas.

Cumulative impacts would occur from a combination of activities and uses occurring within the CIAA. In addition to development activities within the JMH CAP planning area, Map 73 and Map 74 show that some existing and future oil and gas development projects are located within the eastern portion of the CIAA. Increasing development and recreation activities, along with the presence of grazing wildlife, would cause soil disturbances, remove vegetation, reduce available forage, and disturb and displace livestock. These impacts could degrade rangeland resources on some allotments and thus jeopardize compliance with the Wyoming Standards for Healthy Rangelands, which could require some operators to alter grazing practices. Implementing appropriate actions for livestock grazing management might be necessary to achieve the standards. Such actions could include, but would not be limited to, reduction of permitted AUMs, modified turnout dates, livestock water developments, range improvements, shorter grazing periods, growing season rest, riparian pastures and exclosures, implementation of forage utilization levels, and livestock conversions. For some allotments, reallocation of AUMs among livestock, wildlife, and wild horses could be required to ensure that adequate forage would be available for big game.

Cumulative impacts would likely be greatest under Alternative 1 and Alternative 2. Under Alternative 1, anticipated grazing use is assumed to increase over the planning period to the fully permitted active use amount (26,830 AUMs), which when combined with other uses and development activities, could cause considerable degradation of rangeland resources. Under Alternative 2, greater restrictions on grazing activities could adversely affect livestock operators and increase operational costs.

4.13.1.5 Vegetation

The CIAA for vegetation comprises the expanded impact analysis area used and analyzed in the Green River RMP (Map 78), which includes the entire Rock Springs Field Office. The cumulative analysis conducted as part of the Green River RMP for this area has been updated as part of the analysis for this plan and includes consideration of all vegetation types, including unique plant communities and special status plant species.

The majority of cumulative effects on vegetation within the CIAA would result from surface disturbing activities that remove vegetation, such as mineral development and associated wells, roads, pipelines, and facilities; rangeland improvements; and other such activities (e.g., geophysical exploration). Vegetation treatments in the form of prescribed burns could also affect vegetative resources. All effects would depend on the amount and timing of activities and whether the amount of activity within the CIAA outpaced the success of reclamation and revegetation efforts in disturbed areas. Impacts are not likely to be significant because of the varied spacing of activities and reclamation and revegetation efforts; however, they are likely to be long term, even with successful reclamation, because most of the native shrub communities (e.g., sagebrush) that would be impacted require in excess of 20 years to reestablish to predisturbance conditions.

Oil and gas development would have the greatest effects on vegetation resources through removal of vegetation by construction of roads and well pads. Areas of intense development, such as those northwest and southeast of the JMH CAP planning area (Map 73), would have more severe localized impacts on vegetative resources. Overall, the amount of disturbance is negligible compared to the amount of total vegetative resources within the CIAA because (1) the majority of affected vegetation types are common

and widely distributed throughout the region and (2) as more wells are being drilled, reclamation of construction size to permanent size and reclamation of abandoned well acres would begin to increase. The implementation of BLM's Mitigation Guidelines (Appendix 5), restrictions on surface use, implementation of the Wyoming Standards for Healthy Rangelands and DPC objectives, and monitoring efforts would provide protection to vegetative resources and help reduce overall effects. Special status plant species, under the ESA and Wyoming BLM sensitive species guidance, would be protected by site-specific mitigation, including exclusion or avoidance of all surface disturbing activities, resulting in minimal impacts, if any, on such species.

Effects on vegetation from rangeland improvements or other possible surface disturbing activities are considered minor compared to the effects of oil and gas development and would result in only localized, short-term adverse effects on vegetative resources.

Effects from vegetation treatments in the form of prescribed burns and mechanical and chemical treatments would include a short-term increase in annual weeds and other invasive species and a short-term decrease in vegetation production. Long-term effects, however, would benefit vegetation through an increase in grass species and vegetation production from conversion of high-density sagebrush to sagebrush/grass communities.

The differences in the projected amount of surface disturbance among the management alternatives (approximately 800 acres) do not affect the overall analysis of cumulative effects on vegetative resources within the CIAA.

4.13.1.6 Wildlife

The CIAA for effects on wildlife in general is the JMH CAP planning area. Effects are discussed in Section 4.4.6 of this document. The CIAAs for big game (elk, pronghorn antelope, and mule deer), greater sage-grouse, and fisheries are all unique and are discussed in each section below.

The majority of cumulative effects on wildlife habitat within all CIAAs would result from surface disturbing and disruptive activities, such as mineral development and associated wells, roads, pipelines, and facilities; rangeland improvements; and other such activities (e.g., geophysical exploration). Effects would be in the form of habitat fragmentation and animal displacement (short or long term). Vegetation treatments in the form of prescribed burns could also affect wildlife resources, particularly greater sage-grouse. All effects would depend on the amount and timing of activities and whether the amount of activity within the CIAA outpaced the success of reclamation and revegetation efforts in disturbed areas.

Loss of vegetation due to development activities would result in a reduction in available habitat and quality of habitat and could result in increasing forage competition among grazing animals. Habitats could be made unavailable to wildlife because of human disturbance factors such as traffic, noise, or increases in livestock during sensitive time periods such as winter, parturition, nesting, and early rearing of young. Impacts on wildlife could be significant if activities were concentrated in areas of sensitive wildlife habitat and/or if increased development and surface disturbance altered existing migration corridors to the extent that access to important habitat areas was greatly reduced.

Effects on wildlife from rangeland improvements or other possible surface disturbing activities generally result in localized, short-term adverse effects on wildlife. However, water developments in areas previously not used would increase forage consumption in those areas. Impacts could be significant if these developments were created in crucial winter range or other sensitive habitats. Any loss of habitat function or habitat value in these vital, high, or BLM sensitive species habitats would be considered a significant impact.

Effects from vegetation treatments in the form of prescribed burns would include a short-term increase in annual weeds and a short-term decrease in vegetation production. Long-term effects, however, would benefit most wildlife through an increase in grass and forb species and vegetation production from conversion of high-density sagebrush to sagebrush/grass communities.

Rocky Mountain Elk. The CIAA for elk is the Steamboat Elk Herd Unit Area (Map 79). The Steamboat elk herd is very susceptible to displacement by human activities because of the lack of hiding and escape cover within the elk herd unit area. The majority of crucial winter range and parturition habitat within the herd unit is located within the JMH CAP planning area, thus signifying the importance of this area to the viability of the entire herd.

As discussed in Section 4.4.6, several studies have shown that persistent disturbance in elk sensitive habitats shifts the areas of use, weakens the tendency of elk to return to the disturbed area, and results in selection of habitat with equal or poorer quality and security. If animals returned to disturbed habitat, populations were generally lower (50 percent) and use of the habitat was unpredictable (Powell 2003; Kuck et al. 1985; Van Dyke and Klein 1996; Johnson and Wollrab 1987).

Mineral development would cause the greatest adverse effects on the Steamboat elk herd through direct loss of habitat and animal displacement. Activities occurring within the JMH CAP planning area (HS Natural Gas and Nitchie Gulch projects) and those within the elk CIAA (the Bravo Unit, Hay Reservoir, Lower Bush Creek, Stagecoach, Continental Divide/Greater Wamsutter, and Bridger Coal projects, and the Monell and Shell pipelines) constitute existing and reasonably foreseeable activities within the elk CIAA. Given what has been documented about the Steamboat elk herd in Chapter 3 and elsewhere in this chapter, along with the above determinations, these activities would likely cause displacement of animals and the selection of alternate habitats of suboptimal quality. The location of the Bravo Unit project would likely severely inhibit elk movement between winter range located just east of the project area and within the JMH CAP planning area. The locations of the Monell pipeline and the Continental Divide/Greater Wamsutter and Bridger Coal projects are expected to severely inhibit elk movement and/or displace elk from winter range between the Bridger Coal project and the Continental Divide/Greater Wamsutter project and within the JMH CAP planning area. The locations of the HS Natural Gas, Nitchie Gulch, and Cedar Canyon projects, in addition to existing leases within the migratory corridor (connectivity area) of the JMH CAP planning area, could inhibit elk movement from parturition areas to winter range located west and south of the JMH CAP planning area across Highway 191 and similar habitat within the JMH CAP planning area.

Depending on the timing of activities and the location of surface disturbance within the CIAA, the potential exists for long-term disruption of migration corridors between key habitats. If migration were disrupted and an increased amount of direct loss of habitat occurred within key habitats over the short term, particularly within the JMH CAP planning area, it is highly likely that long-term displacement of elk from these habitats would occur, resulting in a significant impact on the Steamboat elk herd.

JMH CAP Alternative 1 would result in the highest amount of surface disturbing and disruptive activities within the JMH CAP planning area because this alternative has the highest estimate of development activities and minimal restrictions on these activities within big game habitats. Alternative 1 would likely result in significant adverse effects on the Steamboat elk herd, possibly resulting in complete abandonment of the area. JMH CAP Alternative 2 would result in the least amount of surface disturbing and disruptive activities within the JMH CAP planning area because the area would be virtually closed to the majority of mineral activities and because of the closure of all big game sensitive habitats. Alternative 2 would ensure that the majority of big game habitat within the elk herd unit was protected, thus ensuring continued viability of the herd. The Proposed JMH CAP fluid mineral leasing implementation strategy could result in significant adverse effects on the Steamboat elk herd. The significance of these effects

would depend on the amount, timing, and duration of development activities. There is a high potential for existing leases to block migration corridors and a clear lack of alternate habitats, (particularly parturition areas) for elk to move into as a result of development in Area 3.

Pronghorn Antelope. The CIAA for pronghorn antelope constitutes the Sublette and Red Desert Herd Unit Areas (Map 80). As stated in Chapter 3, the Sublette and Red Desert herds were below objective in 2002. The majority of antelope crucial winter range occurs within the southern portions of both herd areas, with a large portion of it around Rock Springs and along the Interstate 80 corridor.

As stated in Section 4.4.6, there are no known published studies on pronghorn antelope reactions to roads and/or disruptive human activities. Roads, fences, and pipelines do, however, fragment habitat and can impede or block antelope movement. The density at which these occur could have a significant effect on antelope migration and use of habitat.

Mineral development would have the greatest adverse effects on the Sublette and Red Desert pronghorn antelope herds through habitat fragmentation resulting from the proliferation of roads, pipelines, and wells. Of the two pronghorn populations, road proliferation has and would impact the Sublette herd unit the most. Currently, all occupied habitats have been affected, especially crucial winter ranges, where road densities average more than 2 miles of road in each square mile of crucial winter habitat (USDI 1999). Road proliferation would continue to occur with oil and gas projects in both herd units. These projects include Stagecoach, Moxa Arch, Fontenelle, LaBarge CAP, Pinedale Anticline, Jonah, Cedar Canyon, Nitchie Gulch, HS Natural Gas, and the Continental Divide/Greater Wamsutter projects. The locations of Stagecoach, Fontenelle, LaBarge CAP, Moxa Arch, Cedar Canyon, and Continental Divide/Greater Wamsutter could greatly reduce, or even eliminate, migration corridors throughout antelope crucial winter range in the CIAA.

Densities of existing active wells are also relatively high throughout the Sublette Herd Area, and the majority of the wells proposed would be drilled in the Sublette Herd Area. The new wells would further contribute to overall antelope habitat fragmentation.

Depending on the timing of activities and the location of surface disturbance within the CIAA, the potential exists for disruption of crucial winter range continuity and migration corridors between key habitats.

The differences between the JMH CAP alternatives do not greatly affect the overall analysis of cumulative effects on pronghorn antelope within the CIAA.

Mule Deer. The CIAA for mule deer constitutes the portions of the Sublette and South Wind River Herd Unit Areas and all of the Steamboat Herd Unit Area (Map 81). As stated in Chapter 3, the Steamboat herd was below objective in 2002. The South Wind River herd was also below objective in 2002, but the Sublette herd was above objective in 2002. The majority of the parturition habitat for the Sweetwater herd is within the JMH CAP planning area, thus signifying the importance of this area to the viability the herd. Approximately 50 percent of the crucial winter range for the Steamboat herd unit is within the JMH CAP planning area and the remainder is just south of the JMH CAP planning area. The majority of the crucial range for the Sublette herd is directly northwest of the JMH CAP planning area and within the CIAA.

As demonstrated in Section 4.4.6, there are few published studies on mule deer reactions to roads and/or disruptive human activities; however, like elk, mule deer tend to avoid areas of disruptive activity and are more sensitive to activity in open versus forested habitat.

Mineral development would have the greatest adverse effects on mule deer habitats within the CIAA through direct loss of habitat and animal displacement. Activities occurring within the JMH CAP planning area (HS Natural Gas and Nitchie Gulch projects) and those within the mule deer CIAA (Cedar Canyon, Bravo Unit, Hay Reservoir, Lower Bush Creek, Stagecoach, Continental Divide/Greater Wamsutter, Pinedale Anticline, Jonah, Fontenelle, and Bridger Coal projects, and the Monell and Shell pipelines) constitute existing and reasonably foreseeable activities within the mule deer CIAA. Activities within the JMH CAP planning area and Cedar Canyon project area would likely cause displacement of animals and selection of suboptimal habitats. The location of the Cedar Canyon project would likely inhibit mule deer movement between parturition areas and winter range located just southeast of the project area and within the JMH CAP planning area. Wyoming State Highway 28 is the only existing project and there are no proposed projects that would impede or disrupt movement from crucial winter range between the JMH CAP planning area and crucial winter range northwest and northeast of the JMH CAP planning area.

Depending on the timing of activities and the location of surface disturbance within the CIAA, the potential exists for long-term disruption of migration corridors between key parturition habitats. If migration were disrupted and an increased amount of direct loss of habitat occurred within parturition habitats over the short term, particularly within the JMH CAP planning area, it is highly likely that long-term displacement of mule deer from these habitats would occur, resulting in a significant impact on mule deer herds.

JMH CAP Alternative 1 would result in the highest amount of surface disturbing and disruptive activities within the JMH CAP planning area because it has the highest estimate of development activities and minimal restrictions on these activities within big game habitats. Alternative 1 would likely result in significant effects on the mule deer herds. JMH CAP Alternative 2 would result in the least amount of surface disturbing and disruptive activities within the JMH CAP planning area because the area would be virtually closed to the majority of mineral activities and because of the closure of all big game sensitive habitats. Alternative 2 would ensure that the majority of the parturition habitat within the mule deer CIAA was protected, thus ensuring the continued viability of the herds. The Proposed JMH CAP fluid mineral leasing implementation strategy would likely have significant adverse effects on mule deer herds. The significance of these effects would depend on the amount, timing, and duration of development activities. There is high potential for existing leases to block migration corridors and a clear lack of alternate habitats of equal quality for mule deer to move to as a result of the concentrated timing of development in Area 3.

Greater Sage-Grouse. The CIAA boundary for greater sage-grouse includes the Upper Green River Basin, as recommended by the WGFD Wyoming Greater Sage-Grouse Conservation Plan (2003) for local working groups (Map 82). The greater sage-grouse CIAA differs from that recommended for the local working group in that it has been cut off at I-80 because of the assumption that greater sage-grouse do not migrate across this barrier. Greater sage-grouse leks are spread throughout the CIAA.

The majority of cumulative effects on greater sage-grouse habitat within the CIAA would result from surface disturbing and disruptive activities, such as mineral development and associated infrastructure (e.g., wells, roads, pipelines, compressors, and facilities), rangeland improvements, and other activities (e.g., geophysical exploration). These activities would result in direct loss of habitat, habitat fragmentation, and animal displacement (short or long term), depending on the amount, location, and timing of activities.

Mineral development would have the greatest effects on greater sage-grouse habitats within the CIAA. Activities occurring within the Bravo Unit, Hay Reservoir, Lower Bush Creek, Continental Divide/Greater Wamsutter, Pinedale Anticline, Jonah, LaBarge CAP, Moxa Arch, and Fontenelle oil and

gas projects constitute existing and reasonably foreseeable mineral activities within the greater sage-grouse CIAA. Given what has been shown in this document (in Chapter 3 and elsewhere in this chapter) about greater sage-grouse populations and the effects of human activities on them, these activities are located in the areas of greater sage-grouse lek concentration and would likely cause long-term displacement of animals through habitat loss and lek abandonment, thus contributing to current population declines and resulting in a significant impact on greater sage-grouse. Seasonal limitations for reduction of disturbance applied within a specified distance of leks (generally up to 2 miles) during breeding and nesting time have not prevented the 70 percent decline in populations in the area during the past 50 years and would not prevent further habitat loss from occurring. Adoption of the greater sage-grouse management recommendations in the Proposed Alternative and Appendix 6 should reduce, and could possibly stop, the rate of decline of greater sage-grouse in the JMH CAP planning area.

Vegetation treatments in the form of prescribed burns could also affect greater sage-grouse through removal of large areas of sagebrush, conversion of sagebrush habitats, and increases in invasive species. Provided that the use of vegetation treatments is carefully evaluated before implementation, effects of treatments should not lead to long-term displacement of greater sage-grouse and could improve habitat for greater sage-grouse in some areas.

The JMH CAP No Action Alternative and Alternatives 1 and 3 would lead to the continued decline of greater sage-grouse populations because they contain only seasonal protections of greater sage-grouse habitat. JMH CAP Alternative 2 and the Proposed JMH CAP would provide a greater amount of protection to the species and would stop or slow population declines in the area, and ensure that habitat was preserved for future use.

Fisheries. The CIAA boundary for fisheries includes all land inside the JMH CAP planning area; all Hydrologic Unit Code (HUC) Level 12 watersheds that immediately adjoin or overlap the JMH CAP planning area; and all HUC Level 12 watersheds adjacent to Pacific Creek, the Big Sandy River from Big Sandy Reservoir to the confluence with the Green River, and the Sweetwater River and its tributaries from the U.S. Forest Service boundary to the Field Office boundary (Map 83).

The health of fisheries within the CIAA is directly related to the overall health and functional capabilities of riparian resources, which in turn are a reflection of watershed health. Any activities that affect the ecological condition of the watershed and its vegetative cover would directly affect the aquatic environment. It is assumed that any substantial disturbance to soils or changes in vegetative cover would have an adverse effect on watershed health and water quality and would therefore have an adverse effect on associated fisheries. The degree of impact attributed to any one disturbance or series of disturbances is influenced by location within the watershed, time and degree of disturbance, existing vegetation, and precipitation. General effects of surface disturbances on water resources and fisheries are discussed in Sections 4.4.2 and 4.4.6, respectively.

Oil and gas development projects within the CIAA include Stagecoach, Cedar Canyon, and the Bravo Unit. Development projects (Stagecoach and Bravo Unit) that have been mitigated to the level of no significant impact are also assumed to have no significant impact on the CIAA. The Cedar Canyon project will have minimal to no impact on fisheries because of surface disturbance and timing stipulations afforded to all streams and riparian areas on BLM-administered lands. The Cedar Canyon project could, however, cause water depletions to the Colorado River through use of water for drilling activities (typically deep wells and coalbed gas wells) and thus could contribute to reduced low flows and, on a broad scale within the Colorado River Basin, peak discharges that could have negative effects on downstream species. Water depletions reduce the ability of the river system to create and maintain important habitats for these species by limiting the nutrient supply and productivity, and therefore the

food supply, brought about by high spring flows. No depletions to the Platte River system are expected because no RFAs were identified within the CIAA that contributes to that system.

Fish species migration in Pacific Creek has been and continues to be blocked by dams and diversions as part of the Eden/Farson Irrigation Project (and irrigation projects in general in this area). This affects all fish species that need to migrate up the creek for spawning, including flannelmouth sucker, a sensitive species. The irrigation project also alters natural flows of the river.

RFAs that benefit fisheries include riparian exclosures along the Big Sandy River and the Little Sandy River, which would enhance riparian plant communities and fishery habitats as mitigation for sheep and cattle conversions; the Bone Draw project, which would increase game fish populations in the Big Sandy River; and the Big Sandy Rock Sill project which would provide some artificial habitat for increasing fish populations in the Big Sandy River.

4.13.2 Heritage Resources

The heritage resource CIAA consists primarily of the JMH CAP planning area, that portion the South Pass Historic Landscape ACEC outside the JMH CAP planning area, and that portion of the Point of Rocks to South Pass City expansion era road outside of the planning area (Map 84). The entire South Pass Historic Landscape ACEC consists of a corridor where four National Historic Trails cross through the area. The Point of Rocks to South Pass City expansion era road represents one of the roads that linked communities along the railroad with newly developing settlements.

Effects on heritage resources within the JMH CAP planning area are analyzed in Section 4.5. Increases in surface disturbing activities, erosion, vibration from vehicles and equipment, soil compaction, and landscape alteration could result in a loss of potential information, integrity, and cultural values. Any potential effect on heritage resources would be lessened or eliminated to the extent possible through restrictions on surface disturbing activities, and through consultation processes with the SHPO and with Native American tribal representatives.

Potential cumulative impacts on the South Pass Historic Landscape ACEC could result from increased activity in that area. Because the majority of the area surrounding the South Pass Historic Landscape ACEC is managed as the Wind River Front, the Oregon Buttes and Honeycombs WSAs, and the Red Desert Watershed, it is not anticipated that any significant cumulative impacts on the South Pass Historic Landscape ACEC would occur.

Potential cumulative impacts on the Point of Rocks to South Pass City expansion era road could result from increased use of the road inside and outside of the JMH CAP planning area. The road's physical integrity could be affected by increased use due to industrial activity and recreational use. It is not anticipated that impacts would be significant because of the protections afforded this resource.

The differences between the alternatives do not greatly affect the overall analysis of cumulative effects on heritage resources within the CIAA.

4.13.3 Travel, Access, and Realty

The travel management, access, and realty CIAA consists primarily of the JMH CAP planning area, the entire Red Desert Watershed Management Area, the North and South Table Mountains, the Cedar Canyon ACEC, and a portion of White Mountain (Map 85). The entire Red Desert Watershed Management Area contains a ROW window that might affect travel management, access, and realty resources. The North and South Table Mountain area is an NSO area, and no facilities, such as communication towers or other

ROWs, would be allowed within these features. Cedar Canyon and a portion of White Mountain are proximate to the JMH CAP planning area. White Mountain provides opportunity for communication sites and other structures to be placed within the area.

Potential adverse cumulative effects within the CIAA could arise from factors such as the restrictions placed on access and OHV use, and the locations and management of WSAs. These potential concerns limit the location of activities and development, including communication sites; alternative forms of energy, such as wind energy towers; and potential power lines. Roads associated with oil and gas development projects would also be restricted within the CIAA, particularly in the Red Desert Watershed Management Area, Cedar Canyon, and North and South Table Mountain because of restrictions in each area. All restrictions would reduce the potential for ROW locations, limit access, and limit OHV use, resulting in overall negative cumulative effects within the CIAA. Effects would not be considered significant, however, because opportunities for ROWs, reasonable public access, and OHV use would still be available. Long linear facilities such as cross-country pipelines or power line transmission lines, would likely be routed around the JMH CAP planning area and portions of the CIAA. In particular, the exclusion area within the South Pass Historic Landscape ACEC and limitations on facilities in the Red Desert Watershed would require reroutes. However, the major ROW windows established in the Green River RMP to the east and south of the CIAA would provide opportunity to locate these types of facilities.

Impacts would be least extensive under Alternative 1 because of fewer restrictions on seasonal access, OHV use, ROWs, and other surface disturbing activities. Impacts would be greatest under Alternatives 2 and 3 because of an increase in restrictions on seasonal access, OHV use, ROWs, and other surface disturbing activities. Under the Proposed JMH CAP, cumulative impacts would be greater than under the No Action Alternative because of increased restrictions on seasonal access, OHV use, ROWs, and other surface disturbing activities. The development of a transportation plan in Alternatives 2 and 3 and the Proposed JMH CAP would reduce cumulative impacts by facilitating management of travel and access.

4.13.4 Recreation Resources

The CIAA for recreation resources is the JMH CAP planning area. The analysis area was not expanded outside of the JMH CAP planning area. Effects on recreation resources within the JMH CAP planning area are analyzed in Section 4.7.

Cumulative impacts would occur as a result of increased recreation demand and uses to the point where conflicts would occur between development activities and unconfined dispersed recreation opportunities. Development activities could degrade certain recreation settings, resulting in the degradation of some recreational experiences due to increased visual impacts, noise, and concerns for public health and safety. Some hunting opportunities could also diminish in areas where development occurs, because of the displacement of animals and because of measures applied to protect public health and safety. Development and restrictions could reduce recreation opportunities for some users; however, the same restrictions could also enhance the experience of other users.

Under Alternative 1, cumulative impacts on recreation would increase because of increased development activities and fewer land resource restrictions, and because of public health and safety concerns. Under Alternatives 2 and 3 and the Proposed JMH CAP, impacts on recreation would likely decrease because of anticipated decreases in development activities, increased land resource protections, and decreases in oil and gas development. Mitigation could offset some impacts on one user group, while potentially increasing impacts on others.

4.13.5 Minerals and Alternative Energy Resources

The CIAA for minerals and alternative energy resources consists of the JMH CAP planning area because activities and resources occurring within the JMH CAP planning area are not expected to affect minerals and alternative energy resources outside of the JMH CAP planning area. Effects on mineral and alternative energy resources within the JMH CAP planning area are analyzed in Section 4.8.

The evaluation of cumulative impacts on resource development activity includes consideration of the relative changes in resource development in the planning area and nearby areas that are operated and serviced by the same economic interests. The projected activity levels in the planning area are compared to resource development and related economic activity in the other parts of the three-county area in the assessment of cumulative impacts on mineral and energy resources.

Oil and gas development is expected to increase from current conditions under the JMH CAP No Action Alternative. However, some growth in development would be prohibited or curtailed as a result of conflicts with environment-related resource values. Production would be expected to increase slightly from current levels. Restrictions on ROWs could limit operator ability to develop and move product from within the planning area and could also disrupt regional planning associated with gas collection and delivery systems.

Under JMH CAP Alternative 1, restrictions on leasing would be eased, with new leasing allowed to follow industry interest except in WSAs. Lease stipulations would consider legally protected resources but would not have additional restrictions, such as surface disturbance and timing restrictions. In addition, restrictions on ROWs and access would be eased throughout the planning area, which would increase geophysical exploration as well as improving the ability to move product to market. Local lessees and operators would greatly benefit from increased land availability and production.

Under JMH CAP Alternative 2, a number of restrictions on leasing and access would limit mineral development throughout the planning area. This includes lease stipulations, seasonal restrictions, and NSO requirements. Restrictions could have a significant impact on local lessees and operators.

Under JMH CAP Alternative 3, the amount of acreage available for leasing would increase relative to the No Action Alternative. However, restrictions on access could limit growth in mineral development throughout the planning area. This includes lease stipulations, seasonal restrictions, and NSO requirements. In addition, restrictions on ROWs could limit the ability to develop and move product from within the planning area. Although the restrictions are not expected to be as significant as those under Alternative 2, the restrictions that could be applied through adaptive management actions could have a significant impact on local lessees and operators if the activity restrictions extended far into the future.

Closure to or restrictions on leasing within Area 3 of the JMH CAP fluid mineral leasing implementation strategy (Appendix 17) could have a significant impact on individual operators by limiting growth in mineral exploration and development, causing a loss of opportunity to obtain new leases and inability of operators to block up leases or unitize existing leases in this area. Other restrictions, such as lease stipulations, seasonal restrictions, and NSO requirements, could further impact growth potential through associated compliance costs.

4.13.6 Visual Resources

The visual resource CIAA consists primarily of the JMH CAP planning area and expands out to include that portion of the South Pass Historic Landscape ACEC not located within the JMH CAP planning area

(Map 86). The entire South Pass Historic Landscape ACEC represents four National Historic Trails through the area and encompasses their associated viewsheds.

Effects on visual resources within the JMH CAP planning area are analyzed in Section 4.9. No effects on visual resources on that portion of the South Pass Historic Landscape ACEC not located within the JMH CAP planning area are expected to occur because of VRM designations within the ACEC and surrounding areas (Wind River Front, the Oregon Buttes and Honeycombs WSAs, and the Red Desert Watershed).

Cumulative impacts that enhance visual resources would likely decrease, and impacts that degrade visual resources would increase, under Alternative 1, because of fewer protections afforded to important and sensitive resources, increased development of oil and gas resources, and fewer restrictions on linear facilities. VRM Class II values in the Greater Sand Dunes ACEC area could be in jeopardy, because increased oil and gas development would add additional production facilities that could result in a VRM class reduction. Cumulative impacts that enhance visual resources would likely increase under Alternatives 2 and 3 and the Proposed JMH CAP, while impacts that degrade these resources would decrease. This is due to additional protections afforded to important and sensitive resources, decreased development of oil and gas resources, and increased restrictions on linear facilities.

4.13.7 Special Management Areas and Other Management Areas

The CIAA boundary for special management areas and other management areas includes the entire JMH CAP planning area and those portions of the Red Desert Watershed Management Area and South Pass Historic Landscape ACEC outside of the JMH CAP planning area (Map 87).

Effects on special management areas and other management areas within the JMH CAP planning area are analyzed in Section 4.10.

No potential cumulative impacts from existing or reasonably foreseeable development that would affect the designation or management of the South Pass Historic Landscape ACEC are expected because of strict restrictions on activities within the entire ACEC and management of areas surrounding the ACEC (Wind River Front, the Oregon Buttes and Honeycombs WSAs, and the Red Desert Watershed).

Potential cumulative effects from oil and gas development projects and associated wells, roads, and pipelines could occur in the Red Desert Watershed Management Area. The Bravo Unit, Lower Bush Creek, and a small portion of the Hay Reservoir and Continental Divide/Greater Wamsutter projects are located within the management area. Cumulative impacts could include degradation of visual resources, soils, watershed resources, and vegetation caused by development activities. Restrictions on surface disturbance, such as VRM Class II and III, preferred routes for ROWs, and areas of controlled surface use, within the Red Desert Watershed would reduce possible effects to a minimal level.

Cumulative impacts would be the greatest under Alternative 1 because of increased development activities. Impacts could be significant if they changed the characteristics protected by the SMA designation. Impacts would be least extensive under Alternative 2 because of decreased development activities. Impacts under Alternative 3 and the Proposed JMH CAP would be slightly greater than under Alternative 2 because of fewer restrictions on development activities.

4.13.8 Air Resources

The CIAA boundary for air includes the area for which the air quality modeling of regional impacts was performed in 1999 for the Pinedale Anticline Project in Sublette County.

Potential cumulative impacts on air quality would result from emissions from oil and gas development on existing leases in the planning area, development of new leases outside the core area, and operation of existing wells and compressors throughout the planning area. Wildland fires and prescribed burns would result in emissions of particulates and polyaromatic hydrocarbons, as well as reduced visibility. Vehicular activity could also produce emissions that would degrade air quality.

Preliminary results from air quality impact analyses for proposed projects near the JMH CAP planning area predicted that the PSD Class I area nearest to the Pinedale Anticline Project, Bridger Wilderness, would experience 9 days of visibility with a change of greater than 0.5 dv, suggesting that cumulative impacts on visibility could be significant. Other types of impacts are not anticipated to be significant. Assumptions used in far-field modeling of air quality for the Pinedale Anticline Project included maximum development for the JMH CAP planning area. Because there would be no significant impact on air resources (except for cumulative visibility impacts greater than 0.5 dv) under this maximum scenario (see Table 4-18 below), there would also be no significant impact expected under the lesser development scenarios (the No Action Alternative, Alternative 2, Alternative 3, or the Proposed JMH CAP).

Table 4-18. Summary of Potential Air Quality Impacts From Pinedale Anticline EIS

Air Quality Component	Comment
Air Pollutant Concentrations	
Criteria Air Pollutants	• Near-field total concentrations are in compliance with applicable NAAQS and WAAQS o Particulate matter concentrations 14–33% of standards o NO_2 concentration 9% of standard o SO_2 concentrations 10–17% of standards • Near-field project concentrations are well below applicable PSD Class II increments o PM_{10} concentrations 1–10% of increments o NO_2 concentration .6% of increment o SO_2 concentration 0–.02% of increments • Far-field total concentrations are in compliance with applicable NAAQS and WAAQS o Particulate matter concentrations 12–16% of standards o NO_2 concentration 9% of standard o SO_2 concentrations 10–17% of standards • Far-field project concentrations are well below applicable PSD Class I increments o PM_{10} concentrations 0–2.3% of increments o NO_2 concentration 0–.5% of increment o SO_2 concentration 0–.04% of increments
Visibility	
Days with > 1.0 ádv	• Potential visibility impacts from the Pinedale Anticline Project were less than the FLAG visibility threshold • Potential cumulative visibility impacts were less than the FLAG visibility threshold
Days with > .5 ádv	• Potential visibility impacts from the Pinedale Anticline Project were less than the USFS/NPS visibility threshold • Potential cumulative visibility impacts were greater than the USFS/NPS visibility threshold o 9 days in Bridger Wilderness o 2 days in Fitzpatrick Wilderness o 2 days in Popo Agie Wilderness o 2 day in Wind River Roadless Area
Atmospheric Deposition	
Lake Chemistry Level of Acceptable Change (LAC)	• Cumulative decreases in ANC were less than the lake chemistry LAC for sensitive lakes o 6.8% of LAC for Black Joe Lake o 8.6% of LAC for Deep Lake o 6.7% of LAC for Hobbs Lake o 4.3% of LAC for Ross Lake o 6.7% of LAC for Lower Saddlebag Lake

4.13.9 Socioeconomics

The CIAA boundary for socioeconomics is made up of Sublette, Sweetwater, and Fremont Counties, which include the JMH CAP planning area. The greatest potential for cumulative socioeconomic impacts is associated with increased oil and gas development throughout the region. Significant increases in regional oil and gas development activity in a short period of time can cause notable changes in employment and income. These variables can in turn cause significant deviations in population trends, which have detrimental effects on community services, social structures, and lifestyles. Increased oil and gas development within the JMH CAP planning area is not expected to add significantly to impacts

associated with changes in regional oil and gas development. This is because the amount of development that would occur within the JMH CAP planning area is relatively small compared with other regional development activity plans. Thus, while socioeconomic impacts could occur because of increased oil and gas development, it is not expected that development within the JMH CAP planning area would significantly add to these impacts.

Socioeconomic impacts can also result from changes in recreation and grazing activities. For instance, declines in recreation due to increased conflicts, degradation of recreational experiences, or restrictions on access can have detrimental impacts on social and economic resources in the area. In addition, cumulative impacts on livestock grazing could have negative socioeconomic impacts through a reduction in available forage or an increase in operational costs.

Table 4-1. Summary of Visual Resource Management Classifications

Area	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Proposed JMH CAP
VRM CLASS I					
WSAs	X	X	X	X	X
ACECs + expansions			X		
Oregon Buttes ACEC (included in WSA)	X	X	X	X	X
Red Desert Watershed			X		
Indian Gap			X		
Boars Tusk + 1-mile buffer			X		
Portion of White Mountain			X		
Freighter Gap			X		
Pinnacles Geographic Area			X	X	
Total Affected Area (in acres)	119,340	119,340	409,940	128,300	119,340
VRM CLASS II					
ACECs + expansions (except Oregon Buttes ACEC)				X	X
Steamboat Mountain Management Area					X
Steamboat Mountain ACEC (southern portion)	X				
Greater Sand Dunes ACEC	X	X			
South Pass Historic Landscape ACEC	X	X			
White Mountain Petroglyphs ACEC	X	X			
Split Rock			X	X	
Red Desert Watershed Management Area				X	
Areas adjacent to WSAs	X	X		X	X
West Sand Dunes Archaeological District					X
Continental Peak/South Pass Connecting Side Trail			X	X	
Wetlands, riparian areas, and 100-year floodplains + 500-foot buffer			X		
Portion of White Mountain				X	X
Pinnacles Geologic Feature					X
Elk crucial habitat			X		
Deer crucial habitat			X		
Antelope crucial habitat			X		
Elk birthing areas			X		
Deer birthing areas			X		
Raptor nest sites + ½- to 1-mile buffer			X		
Greater sage-grouse concentration areas			X		

Table 4-1. Summary of Visual Resource Management Classifications (Continued)

Area	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Proposed JMH CAP
Greater sage-grouse winter range[1]			X		
Mountain plover aggregation areas			X		
Connectivity area			X		
Boars Tusk				X	
Total Affected Area (in acres)	181,230	146,050	177,800	265,720	199,980
VRM CLASS III					
Remainder of the planning area not designated as VRM Class I or Class II			X		
Steamboat Mountain ACEC (northern portion)	X				
Red Desert Watershed Management Area	X				X
Portion of White Mountain	X				X
Split Rock (portion not Class II)	X				X
Eden Valley	X			X	X
Total Affected Area (in acres)	117,110	0	34,600	6,090	67,240
VRM CLASS IV					
Remainder of the planning area not designated as VRM Class I, Class II, or Class III	X	X		X	X
Total Affected Area (in acres)	204,660	356,950	0	222,230	235,780

Table 4-2. Summary of Special Management Area Designations

Area	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Proposed JMH CAP
RESEARCH NATURAL AREA					
Paleosol deposition area			X		
Basin big sagebrush/lemon scurfpea (within Steamboat Mountain ACEC)			X		
Cushion plant community			X		
Dunal ponds (flockets)			X		
Total Affected Area (in acres)	0	0	33,110	0	0
ACEC REMOVALS, EXPANSIONS, and DESIGNATIONS					
Steamboat Mountain ACEC removal		X			
Steamboat Mountain ACEC expansion			X	X	X
Greater Sand Dunes ACEC expansion			X	X	
Special Status Plants ACEC expansion			X	X	
Cushion Plant Community ACEC designation			X	X	
Pinnacles Geologic Feature ACEC designation			X		
Total Affected Area (in acres)	0	48,350	129,190	39,070	3,980
OTHER SPECIAL MANAGEMENT AREA DESIGNATIONS					
West Sand Dunes Archaeological District					X
Total Affected Area (in acres)	0	0	0	0	19,840

Table 4-3. Summary of Oil and Gas Leases

Area	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Proposed JMH CAP
CLOSED TO NEW LEASES					
Core area	X				
WSAs	X	X	X	X	X
ACECs + expansions			X		
Red Desert Watershed Management Area			X		
Pinnacles Geographic Area			X	X	
Wetlands, riparian areas, and 100-year floodplains + 500-foot buffer			X		
National Historic Trails + ¼-mile buffer			X		
Expansion Era Roads + ¼-mile buffer			X		
Tri-Territory Marker			X		
Slopes > 20 percent			X		
Special Status Plants ACEC			X		
Greater sage-grouse concentration areas			X		
Greater sage-grouse winter range[1]			X		
Raptor nest sites + ½- to 1-mile buffer			X		
Mountain plover aggregation areas			X		
Elk crucial habitat			X		
Deer crucial habitat			X		
Antelope crucial habitat			X		
Elk birthing areas			X		
Deer birthing areas			X		
Connectivity area			X		
Area 3 (Appendix 17)					X
Sensitive resources					X
Total Affected Area (in acres)	210,050	119,340	584,420	128,300	316,570
OPEN TO LEASING CONSIDERATION					
Remainder of the planning area not closed to new leases	X	X	X	X	X
Total Affected Area (in acres)	412,290	503,000	37,920	494,040	305,770

[1]*Only sagebrush vegetation is expected to be suitable habitat.*

Table 4-4. Summary of Coal and Sodium Exploration

Area	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Proposed JMH CAP
CLOSED TO EXPLORATION					
Entire planning area			X		
WSAs	X	X		X	X
Oregon Buttes ACEC (included in WSA)	X	X		X	X
Steamboat Mountain ACEC + expansion				X	
Steamboat Mountain ACEC (outside area with coal recommendation)	X				X
Steamboat Mountain Management Area (outside area with coal recommendation)					X
South Pass Historic Landscape ACEC (visible portion)	X			X	X
White Mountain Petroglyphs vista	X			X	X
Pinnacles Geographic Area				X	
Boars Tusk	X	X		X	X
Crookston Ranch	X	X		X	X
Tri-Territory Marker	X	X		X	X
Wetlands, riparian areas, and 100-year floodplains + 500-foot buffer	X			X	X
Special status plants	X				X
Special Status Plants ACEC				X	
Cushion Plant Community ACEC				X	
Raptor nest sites (active)	X			X	X
Greater sage-grouse leks + ¼-mile buffer	X				X
Greater sage-grouse leks + ½-mile buffer				X	
Total Affected Area (in acres)	272,440	119,430	622,340	306,500	319,830

Table 4-5. Summary of Coal Occurrence and Development Potential

Area	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Proposed JMH CAP
CLOSED TO FEDERAL COAL LEASING CONSIDERATION					
Entire coal development potential area			X		
Sand Dunes WSA	X	X		X	X
Greater Sand Dunes ACEC (western portion)	X	X		X	X
Total Affected Area (in acres)[1]	4,960	4,960	53,310	4,960	4,960
OPEN TO FEDERAL COAL LEASING CONSIDERATION WITH NO SURFACE OCCUPANCY					
Boars Tusk	X	X		X	X
Crookston Ranch	X	X		X	X
Total Affected Area (in acres)[1]	70	70	0	70	70
OPEN TO FEDERAL COAL LEASING CONSIDERATION FOR SUBSURFACE MINING WITH CONTROLS ON SURFACE ACTIVITIES AND FACILITIES					
Greater Sand Dunes ACEC (eastern portion)	X	X		X	X
Steamboat Mountain ACEC	X				
Steamboat Mountain ACEC + expansion				X	X
Steamboat Mountain Management Area					X
Tri-Territory Marker	X	X		X	X
Raptor nest sites + ½- to 1-mile buffer	X			X	X
Raptor nest sites + ¼-mile buffer		X			
Total Affected Area (in acres)[1]	17,980	9,780	0	18,310	20,590

[1]*Acres are only those within the coal development potential area; the remainder of the planning area is not available for coal leasing consideration.*

Table 4-6. Summary of Salable Mineral Development (Mineral Material Sales)

Area	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Proposed JMH CAP
CLOSED TO MINERAL MATERIAL SALES					
Entire planning area			X		
WSAs	X	X		X	X
Oregon Buttes ACEC	X	X		X	X
White Mountain Petroglyphs ACEC	X	X		X	X
Greater Sand Dunes ACEC	X	X			X
Greater Sand Dunes ACEC + expansion				X	
Steamboat Mountain ACEC	X				
Steamboat Mountain ACEC + expansion				X	X
Steamboat Mountain Management Area[1]					X
Lava rock portion of Steamboat Mountain				X	X
South Pass Historic Landscape ACEC (visible portion)	X			X	X
South Pass Historic Landscape (visible portion—1-mile viewshed)		X			
South Pass Summit	X	X		X	X
Pinnacles Geologic Feature					X
Pinnacles Geographic Area				X	
Boars Tusk	X	X		X	X
Crookston Ranch	X	X		X	X
Raptor nest sites (active)	X	X		X	X
Greater sage-grouse leks + ½-mile buffer				X	
Greater sage-grouse leks + ¼-mile buffer					X
Potential greater sage-grouse nesting habitat[2]					X
Special status plants	X	X			X
Special Status Plants ACEC				X	
Total Affected Area (in acres)	215,820	164,510	622,340	255,600	490,540

[1]*Steamboat Mountain Management Area (minus the lava rock portion) could be open to mineral material sales when required to meet other planning objectives within JMH.*

[2]*Only 50 percent of the area is expected to be suitable nesting habitat.*

Table 4-7. Summary of Locatable Mineral Development

Area	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Proposed JMH CAP
WITHDRAWN FROM ALL MINERAL LOCATION					
Entire planning area			X		
Oil shale classification lands (to be revoked)	X	X		X	X
White Mountain Petroglyphs ACEC	X	X		X	X
Greater Sand Dunes ACEC (western portion)	X	X		X	X
Steamboat Mountain diamonds				X	X
South Pass Summit	X	X		X	X
Tri-Territory Marker	X	X		X	X
Crookston Ranch	X	X		X	X
Boars Tusk				X	
Indian Gap				X	
Pinnacles Geologic Feature					X
Public water reserves	X	X		X	X
Special status plants	X	X			X
Special Status Plants ACEC				X	
Raptor nest sites (active)				X	
Greater sage-grouse leks + ½-mile buffer				X	
Elk birthing areas (northern)				X	X
Total Affected Area (in acres)	151,980	151,980	622,340	160,230	155,190
WITHDRAWN FROM NON-METALLIC MINERAL LOCATION					
Coal classification lands (to be revoked)	X	X		X	X
Total Affected Area (in acres)	160,410	160,410	0	342,410	345,740

Table 4-8. Summary of Surface Disturbance and Seasonal Limitations

Area	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Proposed JMH CAP
NO SURFACE OCCUPANCY					
Oregon Buttes ACEC	X		X		X
South Pass Historic Landscape ACEC (visible portion)	X				X
South Pass Historic Landscape (visible portion—5-mile viewshed)			X		
Greater Sand Dunes ACEC + expansion			X		
Greater Sand Dunes ACEC (developed recreation sites and OHV parking lot)	X				X
White Mountain Petroglyphs vista	X		X	X	X
Boars Tusk	X	X	X	X	X
Crookston Ranch + 300-foot buffer			X		
Crookston Ranch + 100-foot buffer	X	X		X	X
Indian Gap + 100-foor buffer	X	X	X	X	X
Tri-Territory Marker	X	X	X	X	X
Slopes > 20 percent			X		
Pinnacles Geographic Area					X
Special status plants	X				X
Special Status Plants ACEC			X	X	
Special status plants potential habitat			X		
Cushion Plant Community ACEC			X		
Greater sage-grouse winter range[1]			X		
Greater sage-grouse leks + ½-mile buffer				X	
Greater sage-grouse concentration areas			X		
Raptor nest sites (active)	X			X	X
Raptor nest sites + ½- to 1-mile buffer			X		
Elk birthing areas			X		
Deer birthing areas			X		
Sensitive resources					X
Total Affected Area (in acres)	74,640	830	337,330	63,840	99,060

Table 4-8. Summary of Surface Disturbance and Seasonal Limitations (Continued)

Area	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Proposed JMH CAP
CONTROLLED SURFACE USE					
Wetlands, riparian areas, and 100-year floodplains + 500-foot buffer	X				X
Wetlands, riparian areas, and 100-year floodplains + 250-foot buffer		X			
Wetlands, riparian areas, and 100-year floodplains + ¼-mile buffer			X	X	
Areas adjacent to WSAs					X
Portion of White Mountain					X
West Sand Dunes Archaeological District					X
Remaining ACECs + expansions				X	
ACECs (except Oregon Buttes ACEC)					X
Steamboat Mountain Management Area					X
Steamboat Mountain ACEC + expansion[3]			X		
Steamboat Mountain crucial overlap[3]			X		
South Pass Historic Landscape ACEC (portion not visible)	X				X
South Pass Historic Landscape (portion not visible—5-mile viewshed)			X		
South Pass Historic Landscape viewshed (1-mile buffer)		X			
Pinnacles Geologic Feature					X
National Historic Trails + ¼-mile buffer	X		X	X	X
Expansion Era Roads + ¼-mile buffer	X	X	X	X	
VRM Class II areas	X				
Slopes > 20 percent				X	X
Slopes > 25 percent	X	X			
Greater sage-grouse leks + ¼-mile buffer	X	X			X
Potential greater sage-grouse nesting habitat[2]					X
Greater sage-grouse winter range[1]					X
Special status plants		X			
Special status plants potential habitat	X	X		X	X
Sensitive resources					X
Total Affected Area (in acres)	244,280	132,860	63,970	243,570	427,930

Area	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Proposed JMH CAP
SEASONAL LIMITATIONS					
Elk crucial habitat	X		X	X	X

Table 4-8. Summary of Surface Disturbance and Seasonal Limitations (Continued)

SEASONAL LIMITATIONS					
Deer crucial habitat	X		X	X	X
Antelope crucial habitat	X		X	X	X
Elk birthing areas	X			X	X
Deer birthing areas	X			X	X
Raptor nest sites + ¼-mile buffer		X			
Raptor nest sites + ½- to 1-mile buffer	X			X	X
Greater sage-grouse leks + ¼-mile buffer	X			X	X
Greater sage-grouse nesting area + 2-mile buffer	X				
Greater sage-grouse potential nesting habitat[2]		X		X	X
Greater sage-grouse winter concentration areas	X				
Greater sage-grouse winter range[1]				X	X
Mountain plover aggregation areas		X			
Mountain plover aggregation areas + ¼-mile buffer			X	X	X
Total Affected Area (in acres)	388,760	273,470	261,390	399,690	476,850

[1] *Only sagebrush vegetation is expected to be suitable habitat.*

[2] *Only 50 percent of the area is expected to be suitable nesting habitat.*

[3] *Applies to portions of ACEC + expansion area that are not NSO for elk and deer birthing.*

Table 4-9. Summary of Off-Highway Vehicle (OHV) Use Designations

Area	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Proposed JMH CAP
OPEN					
Greater Sand Dunes Recreation Area	X	X	X	X	X
Total Affected Area (in acres)	10,020	10,020	10,020	10,020	10,020
CLOSED					
WSAs	X	X	X	X	X
Oregon Buttes ACEC	X	X	X	X	X
White Mountain Petroglyphs ACEC	X	X	X	X	X
Wetlands, riparian areas and 100-year floodplains + 500-foot buffer			X		
Crookston Ranch	X	X	X	X	X
Boars Tusk	X	X	X	X	X
Paleosol deposition area			X		
Pinnacles Geographic Area			X	X	
Pinnacles Geologic Feature ACEC			X		
Pinnacles Geologic Feature					X
Slopes > 25 percent				X	
Slopes > 20 percent			X		
Geologic hazards			X		
Greater sage-grouse concentration areas			X		
Greater sage-grouse winter range[1]			X		
Greater sage-grouse leks + ½-mile buffer				X	
Raptor nest sites + ½- to 1-mile buffer			X	X	
Elk birthing areas			X		
Deer birthing areas			X		
Special status plants	X	X			X
Special Status Plants ACEC			X	X	
Total Affected Area (in acres)	122,590	122,590	445,200	189,580	123,940
LIMITED TO DESIGNATED ROADS AND TRAILS					
Red Desert Watershed Management Area	X			X	X
Steamboat Mountain ACEC	X				
Steamboat Mountain ACEC + expansion area				X	X
Steamboat Mountain Management Area					X
South Pass Historic Landscape ACEC (visible portion)	X			X	
South Pass Historic Landscape (visible portion—1-mile viewshed)		X			

Table 4-9. Summary of Off-Highway Vehicle (OHV) Use Designations (Continued)

Area	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Proposed JMH CAP
LIMITED TO DESIGNATED ROADS AND TRAILS					
South Pass Historic Landscape ACEC					X
Pinnacles Geologic Feature	X	X			
Cushion Plant Community ACEC				X	
Remainder of the planning area not designated as Open or Closed			X		
Total Affected Area (in acres)	176,660	21,480	167,120	149,540	213,810
LIMITED TO EXISTING ROADS AND TRAILS					
Remainder of the planning area not designated as Open, Closed, or Limited to Designated Roads and Trails.	X	X		X	X
Total Affected Area (in acres)	313,070	468,250	0	273,200	274,570
LIMITED TO SEASONAL ACCESS[2]					
Elk crucial habitat	X		X	X	X
Deer crucial habitat	X		X	X	X
Antelope crucial habitat	X		X	X	X
Elk birthing areas	X			X	X
Mule deer birthing areas	X			X	X
Raptor nest sites + ½- to 1-mile buffer	X			X	X
Raptor nest sites + ¼-mile buffer		X			
Greater sage-grouse winter concentration areas	X				
Greater sage-grouse winter range[1]				X	X
Greater sage-grouse nesting area + 2-mile buffer	X				
Greater sage-grouse leks + ¼-mile buffer	X			X	X
Greater sage-grouse potential nesting habitat[3]		X		X	X
Mountain plover aggregation areas		X			
Mountain plover aggregation areas + ¼-mile buffer			X	X	X
Steamboat Mountain	X				X
Total Affected Area (in acres)	398,980	273,470	261,390	476,750	476,750

[1] *Only sagebrush vegetation is expected to be suitable habitat.*

[2] *Seasonal access limitations for the No Action Alternative and Proposed JMH CAP would be implemented on an as-needed basis.*

[3] *Only 50 percent of the area is expected to be suitable nesting habitat.*

Table 4-10. Summary of Rights-of-Way (ROW) Limitations

Area	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Proposed JMH CAP
EXCLUSION AREAS					
WSAs			X	X	
Steamboat Mountain (southern portion)				X	
Face of Steamboat Mountain					X
White Mountain Petroglyphs ACEC	X	X		X	X
White Mountain Petroglyphs vista			X		
Oregon Buttes ACEC			X	X	X
South Pass Historic Landscape ACEC (visible portion)	X				X
South Pass Historic Landscape (visible portion—5-mile viewshed)			X		
Pinnacles Geologic Feature ACEC			X		
Paleosol deposition area			X		
Pinnacles Geographic Area			X	X	
Pinnacles Geologic Feature					X
Greater sage-grouse leks + ½-mile buffer				X	
Greater sage-grouse concentration areas			X		
Greater sage-grouse winter range[1]			X		
Mountain plover aggregation areas + ¼-mile buffer			X		
Special Status Plants ACEC			X	X	
Cushion Plant Community ACEC			X		
Special status plants potential habitat			X	X	
Tri-Territory Marker	X	X	X	X	X
Indian Gap			X		X
Indian Gap +100-ft. buffer				X	
Total Affected Area (in acres)	23,770	40	336,590	156,080	40,200
AVOIDANCE AREAS					
Boars Tusk	X	X	X	X	X
Crookston Ranch	X	X	X	X	X
Indian Gap	X	X			
Oregon Buttes ACEC	X	X			
Steamboat Mountain ACEC	X				
Steamboat Mountain ACEC + expansion area			X		X

Table 4-10. Summary of Rights-of-Way (ROW) Limitations (Continued)

Area	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Proposed JMH CAP
AVOIDANCE AREAS					
Steamboat Mountain Management Area					X
South Pass Historic Landscape ACEC		X		X	
South Pass Historic Landscape ACEC (portion not visible)	X				X
South Pass Historic Landscape (portion not visible)			X		
Greater Sand Dunes ACEC + expansion area				X	
Greater Sand Dunes ACEC + 1-mile buffer	X	X			X
Greater Sand Dunes ACEC + 1-mile buffer (minus paleosol deposition area)			X		
White Mountain petroglyphs vista	X	X		X	X
West Sand Dunes Archaeological District					X
National Historic Trails + ¼-mile buffer	X	X	X	X	X
Expansion Era Roads + ¼-mile buffer	X	X	X	X	X
Greater sage-grouse leks + ¼-mile buffer	X	X			
Greater sage-grouse potential nesting habitat[2]					X
Connectivity area			X		X
Cushion Plant Community ACEC				X	
Special status plants	X	X			X
Special status plants potential habitat	X	X			X
Total Affected Area (in acres)	171,810	153,810	192,110	77,970	434,330

[1] *Only sagebrush vegetation is expected to be suitable habitat.*

[2] *Only 50 percent of the area is expected to be suitable nesting habitat.*

Table 4-11. Grazing Utilization

Species	Herd Unit Objective		Percentage of Herd Within Planning Area	AUMs Needed Within Planning Area				
	No Action Alternative	Action Alternatives		No Action Alternative	Alt. 1	Alt. 2	Alt. 3	Proposed JMH CAP
Elk	500	1,200	75% birth; 55% winter	1,081	2,595	2,595	2,595	2,595
Cattle	NA	NA	NA	10,664	23,627	10,664	10,664	10,664
Sheep	NA	NA	NA	926	3,203	926	926	926
Mule Deer	4,000	4,000	50% yearlong	3,167	3,167	3,167	3,167	3,167
Antelope	6,000	6,000	75% summer; 25% winter	2,980	2,980	2,980	2,980	2,980
Wild Horses	415-600	415-600	33% yearlong	2,118	2,118	2,118	2,118	2,118

**Estimates of AUMs were based on animal unit equivalents (AUE) specified in the Draft Environmental Impact Statement for the Proposed Grazing Management Program for the Salt Wells-Pilot Butte Area, 1983.*

*The stated AUMs for cattle and sheep are based on anticipated use (see livestock grazing assumptions in Section 4.4.4) and do not necessarily reflect actual use, which can vary according to rangeland conditions.

Table 4-12: Total Traffic Miles by Year for Oil and Gas Development (in thousands of miles)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
N. A. Large Truck	10	28	28	28	27	20	17	16	15	15	15	15	15	14	14	14	13	12	12	11	10
N.A. Medium Duty Truck	66	95	95	93	90	74	66	60	59	59	57	57	54	52	47	47	44	40	40	37	31
N.A. Pickup Truck	75	898	899	896	892	584	491	483	442	442	439	440	435	434	427	428	424	378	378	374	368
Alt. 1 Large Truck	10	30	30	30	29	22	19	18	18	18	18	18	17	16	15	14	14	14	14	13	12
Alt. 1 Medium Duty Truck	66	98	98	96	93	77	69	62	63	63	61	61	57	55	50	48	44	43	43	39	34
Alt. 1 Pickup Truck	75	984	985	983	979	670	577	569	570	570	568	568	564	520	514	470	466	464	465	460	454
Alt. 2 Large Truck	10	25	25	25	25	17	15	14	14	14	13	13	13	11	10	10	9	9	9	9	8
Alt. 2 Medium Duty Truck	66	92	92	90	87	71	63	56	56	56	55	55	51	47	42	42	38	37	37	33	28
Alt. 2 Pickup Truck	75	769	770	768	764	455	362	354	355	355	353	353	349	303	255	255	251	249	250	245	239
Alt. 3 Large Truck	10	27	27	27	26	19	16	15	15	15	14	14	14	13	13	13	12	12	12	10	10
Alt. 3 Medium Duty Truck	66	95	95	93	90	74	66	59	59	59	55	55	52	50	45	45	42	40	40	36	31
Alt. 3 Pickup Truck	75	856	856	854	850	541	449	441	442	442	395	396	391	390	383	384	380	378	378	332	326
Proposed Large Truck	10	27	27	27	26	19	16	15	15	15	14	14	14	13	13	13	12	12	12	10	10
Proposed Medium Duty Truck	66	95	95	93	90	74	66	59	59	59	55	55	52	50	45	45	42	40	40	36	31
Proposed Pickup Truck	75	856	856	854	850	541	449	441	442	442	395	396	391	390	383	384	380	378	378	332	326