CHAPTER 4—ENVIRONMENTAL CONSEQUENCES

The "federal action" is the selection of an alternative plan 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 Preferred Alternative 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., non-environmental impact).

An impact is defined as 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 or if an existing undesirable effect is lessened. Although beneficial impacts were identified, the analysis focused on those impacts that were adverse in determining whether the effects were 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 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 Jack Morrow Hills (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 Coordinated Activity Plan (CAP) area. The geographic scope of the JMH CAP cumulative impact analysis considers the area within and around the JMH boundary, including the Green River Resource Planning Area. A cumulative impact analysis would typically consider industrial, military, land management, and economic projects and activities. After review of available information, the following activities have been identified as having the highest likelihood of potential cumulative impacts that could collectively add to impacts from JMH alternatives:

- BLM land management plans and activities outside the JMH planning area boundary
- Regional oil and gas development activities (e.g., exploration, production, and pipeline development)
- Regional recreation activities (e.g., big game hunting, off-highway vehicle (OHV) use, dispersed recreation, etc.)
- Economic development activities in Fremont, Sublette, and Sweetwater counties
- Activities within the Green River, Sweetwater River, and Great Divide basins
- Activities affecting air resources in southwestern Wyoming, north-central Utah, and northwestern Colorado.

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 the 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 to 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 with 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 significant 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 as to the significance of that change was made.

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 1–71. The approximate geographic size of these resources is listed in Table 3-1 at the end of Chapter 3, and the magnitude 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 on which to determine 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 a land use activity may result in unacceptable or irreversible impacts to 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 that affect those resources. The significance criteria and analysis assumptions are described within each subcategory.

4.4.1 Potential Impacts on Fire Management

The fire management program is a land use program that has both adverse and beneficial environmental impacts on resources and nonenvironmental effects to resource users. Impacts that implementation of the fire management program has to resources and resource users are discussed in those particular resource sections. This section describes potential impacts on the fire management program due to implementation of management actions of 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 is 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 for the next 20 years.

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 from 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.

Some activities that would occur under all alternatives that affect fire frequency are OHV use, recreational activity, and mineral exploration and development. These activities introduce additional ignition sources into the planning area, which in turn increases the probability of wildfire occurrence. The activities can occur in remote areas that 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 through decreased firefighting costs but could also adversely impact the opportunity for positive effects of fire.

Fire size and intensity can be affected by the fire suppression activities allowed and 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 impact 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 to existing fuel breaks.

Livestock grazing could also increase fire intensity by decreasing fire frequency. Decreasing the probability of ignition through the reductions 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 increase fire intensity. However, this is not anticipated because of the implementation of the Wyoming Standards for Healthy Rangelands and 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.

These management actions and land use activities could have an adverse impact on the fire program, but the level of significance would depend on the number of wildfires in any given year.

Factors affecting costs associated with prescribed burns include restrictions on vehicle and other equipment use, constructing 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 level of activity.

4.4.1.2 No Action Alternative

Mineral exploration, development, and production increase the potential for wildfire occurrence through an increased number of ignition sources, which in turn increases the cost of managing fire within the planning area. It is assumed that the amount of mineral development that would occur during the planning period is related to available acreage. Therefore reducing available acreage (i.e., closing areas to mineral development) would serve to diminish development activity and subsequently 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). Furthermore the remote areas in which these activities often occur can increase costs related to transporting fire suppression equipment. 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. Limiting OHV use to designated and existing roads and trails could minimize the number of fires ignited by these vehicles. The level of significance of these activities on the fire management program would be dependent on the number of human-caused fires in any given year.

Impacts of management actions for wild horses on the fire management program would be similar to those resulting from livestock grazing, but on smaller scale and over a smaller area. Management of wild horses could serve to reduce fine fuels through foraging 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 healthy rangeland standards 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 through 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 to 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.

Cumulative Impacts. Increased development activities and recreation may increase the potential for human-caused wildfires, including fires occurring within or adjacent to developed sites. Oil, gas, and other developments (e.g., power lines and pipelines) diminish opportunities to use fire as a treatment tool to rejuvenate decadent plant communities, because of safety concerns. With increased development and attendant infrastructure (power lines, compressors, pipelines, fuel tanks, etc) comes a corresponding increase in the potential for fire suppression to occur within the Wildland-Urban Interface (WUI). Suppression activities within WUI areas can be more dangerous, time-consuming and expensive. Particularly critical would be the extra caution required for firefighter safety within an active gas field. Cost can be increased substantially because of the increased value of developed sites compared to undeveloped rangeland. Cumulative impacts on fire management are expected to be minimal.

4.4.1.3 Alternative 1

Impacts on the fire management program from implementing management actions for wild horses and vegetation would be similar to those of 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 throughout the planning area because of more available areas in which to travel. The potential for increasing fire frequency and increasing the cost of fire suppression because of these recreational activities would depend on of the number of human-caused fires in any given year.

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 through an increased number of ignition sources. Conversely, the increased and/or improved access and construction of fuel breaks due to increased mineral activities could improve suppression opportunities and effectiveness. The level of significance of these impacts would be dependent 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 associated with livestock grazing on the fire management program.

Activities related to special management areas under this alternative could reduce localized effects to fire management. Removing the Area of Critical Environmental Concern (ACEC) designation from Steamboat Mountain and reducing the viewshed of the National Historic Trail Special Recreation Management Area through South Pass would eliminate specific management actions associated with these areas, which would in turn reduce the amount of area subject to fire suppression-related limitations and restrictions.

Cumulative Impacts. Cumulative impacts would be the same as those described in the No Action Alternative, except impacts would be greatest under this alternative because of anticipated increases in development activities and access. Cumulative impacts on fire management, although greatest for this alternative, are expected to be minimal.

4.4.1.4 Alternative 2

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

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

Recreation management activities could have less of an impact on fire management 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 or limited to OHV use. This would likely decrease fire frequency caused by human activity and have an overall beneficial effect to the fire management program.

This alternative provides the least opportunity for mineral development and production, which would result in reduced adverse impacts to fire management as compared to 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 ignitions sources.

Activities related to special management areas could result in greater impacts on the fire management program than under the other alternatives. Management actions associated with the expansion of existing ACECs and historic viewsheds, and management of new ACECs and Wilderness Study Areas (WSAs), could increase the amount of area subject to fire suppression-related limitations and restrictions. This could 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 to existing fuel breaks. The level of significance would depend on the number of wildfires occurring in these special management areas in any given year.

Cumulative Impacts. Cumulative impacts would be the same as those described in the No Action Alternative, except restrictions on development and access would further reduce the

potential for human-caused wildfires and wildland-urban interface situations, minimizing cumulative impacts on fire management. However, limitations placed on vehicle use and fire suppression activities could add to suppression costs.

4.4.1.5 Alternative 3

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

Recreation management activities could have less of an impact on fire management than under the No Action Alternative. Camping would only be allowed 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 impacted by escaped campfires or other accidental ignitions. Additional portions of the planning area would be closed or limited to OHV use. This would likely decrease fire frequency caused by human activity, and consequently the cost of managing fire within the planning area.

Impacts on the fire management program from mineral development would be similar to those of the No Action Alternative. The amount of area closed to mineral development would be far less than under Alternative 2 and considerably more than Alternative 1. Therefore adverse impacts would be anticipated (increased fire frequency caused by an increase in ignition sources), but comparable to the other alternatives.

Expanding the Divide Basin Wild Horse HMA to include the entire planning area could potentially 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, as the number of horses allowed in the expansion area would be limited.

Impacts related to special management areas would be similar to those of Alternative 2 but not as intense because of less area managed with fire suppression-related limitations and restrictions. Fewer expansions and management prescriptions for special management areas under this alternative would result in fewer management actions that place limitations and restrictions on fire suppression activities.

Cumulative Impacts. Cumulative impacts would be the same as those described in the No Action Alternative, except restrictions on development and access would further reduce the potential for human-caused wildfires and wildland-urban interface situations, minimizing cumulative impacts on fire management. However, limitations placed on vehicle use and fire suppression activities could add to suppression costs. Cumulative impacts would be greater than under Alternative 2 because of fewer restrictions on development and access.

4.4.1.6 Preferred Alternative

The management actions associated with the alternatives 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 impact 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 to existing fuel breaks. The level of significance would depend on the number of wildfires occurring in these areas in any given year.

Prescribed burning could adversely impact the fire management program through increased costs. Factors may include restrictions on vehicle and other equipment use, constructing 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, as 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 through an increased number of ignition sources, which in turn increases the cost of managing fire within the planning area. It is assumed that the amount of mineral development that would occur during the planning period is related to available acreage. Therefore reducing available acreage (i.e., closing areas to mineral development) would serve to diminish development activity and subsequently reduce adverse impacts on the fire management program. The adaptive management strategy under this alternative would initially preclude some development from occurring, potentially resulting in less impact than under the No Action Alternative. However, because of the uncertainty of the outcome of this adaptive management strategy, the level of long-term impact is not known. Significance level would depend on the amount of area ultimately developed over the planning period and the number of human-caused fires in any given year.

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 the remote areas in which these activities often occur can increase costs related to transporting fire suppression equipment. 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 number of fires ignited by these vehicles. The level of significance of these activities on the fire management program would be dependent on the number of human-caused fires in any given year.

Livestock grazing can affect fire frequency by reducing fine fuels, which decreases the probability of ignition. This could benefit the fire management program through decreased firefighting 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 reductions 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 increase fire intensity. However, this is not anticipated because of the implementation of healthy rangeland standards and DPC objectives, which would ensure that widespread overgrazing would not occur. Fine fuel reduction by foraging livestock could

also adversely impact fire prescription activities by limiting the ability of an area to support prescribed fire as a management tool.

Impacts of management actions for wild horses on the fire management program would be similar to those resulting from livestock grazing, but on smaller scale and over a smaller area. Management of wild horses could serve to reduce fine fuels through foraging 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 healthy rangeland standards 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 through 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 to 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 could result in greater adverse impacts on the fire management program than under the No Action Alternative. The management prescriptions for special management areas could increase the amount of area subject to fire suppression-related limitations and restrictions, which could impact 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 to existing fuel breaks. The level of significance would depend on the number of wildfires occurring in these special management areas in any given year.

Cumulative Impacts. Increased development activities and recreation may increase the potential for human-caused wildfires, including fires occurring within or adjacent to developed sites. Oil, gas, and other developments (e.g., power lines and pipelines) diminish opportunities to use fire as a treatment tool to rejuvenate decadent plant communities, due to safety concerns. With increased development and attendant infrastructure (power lines, compressors, pipelines, fuel tanks, etc.) comes a corresponding increase in the potential for fire suppression to occur within the WUI. Suppression activities within WUI areas can be more dangerous, time-consuming, and expensive. Particularly critical would be the extra caution required for firefighter safety within an active gas field. Cost can be increased substantially because of the increased value of developed sites compared to undeveloped rangeland. Further increases in cost could result from limitations placed on vehicle use and fire suppression activities. Cumulative impacts would be less extensive than under the No Action Alternative because of restrictions on development and access that would further reduce the potential for human-caused wildfires and wildland-urban interface situations.

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 adjacent to these waterways; wetlands; floodplains; recharge areas; and ground water. The impacts that implementation of water resource management actions have on other resources and resource users are discussed in those particular resource sections. This section describes potential impacts on water resources due to the implementation of management actions for other resource management categories.

Adverse impacts on water resources would be considered potentially significant as a result of human activities if proper functioning condition (PFC) could not be attained or maintained as a minimum physical state. Actions that accelerate erosion and runoff and alter the physical characteristic or degrade water quality beyond the designated use of the receiving stream (Table 3-5) would be 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 ground water 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 has an adverse effect on watershed health and water quality. 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 sediment and nutrient loads to local channels.

4.4.2.1 Common to All Alternatives

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 stream banks, reduce erosion and sediment yield, promote vegetative cover, and enhance 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 to the resource. Aquatic, wetland, and riparian habitat would not be disposed unless exchanged for lands with equal or greater value (including monetary and functional resource values).

BLM would continue to participate with federal, state, and local government agencies and the Colorado River Salinity Control Forum to develop and implement salinity control plans for the basin and to maintain existing and future applicable water quality plans.

Management of heritage resources would have an insignificant impact 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 via surface disturbances and vegetation removal if not properly conducted. Indirect effects could occur when avoidance of cultural sites directs 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. Moreover, protection measures afforded by the National Historic Preservation Act would further mitigate any potential adverse impacts.

Fire could have both beneficial and adverse impacts on water resources. Beneficial and adverse impacts could be either short-term or long-term (depending on fire size and type). Adverse impacts could include increased runoff from exposed soils and sedimentation of surface waters. Wildfires usually have more adverse impacts than 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. This could result in long-term adverse impacts by compromising future plant rejuvenation and growth rates. Fire suppression activities could cause increased soil erosion from fire line construction and heavy equipment transport. 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. Prescribed fire burning within prescription areas would generally have a beneficial effect on watershed health by increasing age and species diversity of plant communities, promoting thicker vegetation growth which could slow erosion rates, and enhancing nutrient cycling. These effects are generally long-term.

Livestock grazing could have localized adverse impacts on watershed resources and water quality. Soil compaction and loss of vegetative cover could result in reduced 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. Implementation of healthy rangeland standards, guidelines for livestock grazing, and DPC objectives would help ensure proper management of livestock resources and serve to minimize 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 range improvements would generally be adversely affected because of construction disturbances (particularly for water developments) 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 loads. With proper planning and effective management of range improvements, any adverse impacts on water resources would be minimized to acceptable levels.

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. 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.

Ground water could be affected during construction of drill pads or from other exploration and development activities. Improper casing and cementing of wells, undetected spills, or leachate from produced water or mud pits could potentially introduce contaminants to the ground water. Chemicals used for production drilling could cause local contamination of soils and ground water 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 to ground water quality. Hydrological investigations would be conducted prior to coalbed methane development to determine whether any connection exists 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 methane production could reduce the quantity of ground water contained within affected aquifers because of the requirement to reinject produced water into different aquifers of equal or lower water quality. In addition, accidental discharges of produced water onto the ground surface could adversely impact any nearby surface water quality. The extent of any impact would depend on the quality of the ground water being discharged. Impacts would generally be greater if the produced water is highly saline.

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

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 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 overall biodiversity. Vegetation manipulation to enhance wildlife habitat would cause adverse, short-term impacts on watershed resources by removing vegetation and subsequently increasing erosion and sedimentation; however long-term beneficial impacts could be realized by increasing age and species diversity of plants, promoting thicker vegetative growth to slow erosion, and enhancing nutrient cycling.

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 actions for special management areas could benefit 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 from occurring.

4.4.2.2 No Action Alternative

Impacts on water resources from implementing actions for managing heritage resources, vegetation, wildlife, and special management areas would be the same as the impacts common to all alternatives.

Prescribed burns and wildfire suppression activities would have both short-term and long-term impacts on water resources, as described above in 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 suppression activities to existing roads and trails) would minimize 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. This vegetation association helps stabilize the sand dunes and maintains the integrity and stability of the watershed in which it grows.

Livestock grazing activities could impact water resources as described for the actions common to all alternatives. Implementation of healthy rangeland standards and guidelines for livestock grazing would ensure that adverse impacts would not be significant. Exclosures and water developments would be constructed as needed to keep livestock out of sensitive riparian areas. Such actions would most likely have a beneficial impact on watershed health and water quality. Prohibiting placement of salt and mineral supplements within 500 feet of riparian areas would minimize soil compaction and subsequent runoff near surface waters.

Surface disturbing activities such as those associated with development and ROWs could cause similar impacts common to all alternatives. Actions that limit the extent of surface disturbing activities generally minimize impacts on surface water sources and recharge areas. Surface disturbance would be controlled within 500 feet of riparian areas, wetlands, and 100-year floodplains. 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 practicable. Controlled use means that surface disturbing activities would avoid these areas unless a site-specific analysis determines that no adverse impacts would occur on water resources. These limitations would ensure that any adverse impacts on water resources would not be significant. Some surface disturbing activities may serve to maintain or improve water quality (e.g., reconstruction of crossing, road surfacing, gabions, etc.).

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

Recreational activities are not anticipated to have significant impacts. Although camping would be allowed within riparian corridors, areas would be closed if resource damage occurs, thereby preventing impacts from becoming significant. Similarly, OHV use designations would help prevent significant impacts from occurring.

Reducing and then 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 could occur, but could be held to an acceptable level if the selective gathering program is 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 herds would help minimize this effect.

Cumulative Impacts. The potential level of cumulative impact to watershed resources is directly related to the amount, timing, and location of the disturbance in relation to vegetation, soils, and established watercourses. Increased sedimentation could result from any activity that disturbs vegetation, causes soil compaction, or channels overland flows, such as road and well pad construction, livestock trampling, and recreational use (especially OHV activity). Concomitant with loss of vegetative cover and soil loss is increased runoff from denuded surfaces which could destabilize drainages. Appropriate mitigation and project design during site-specific analysis could minimize off-site sedimentation but would be dependent on design and maintenance.

Effects to ground water resources would be dependent on the level of activity and quality and maintenance of wells. Improper casing and cementing of wells, undetected spills, or leachate from produced water or mud pits could potentially introduce contaminants to the ground water. The cumulative impact on ground water aquifers from coalbed methane development cannot be determined because of lack of information. Prior to development, investigation of aquifers and their possible connections to surface waters would provide the information necessary for determining cumulative impacts and any necessary mitigation. Containment and reinjection of produced waters that are not suitable and claimed for surface use would reduce the potential for surface water contamination and accelerated erosion in ephemeral channels.

Under this alternative, the overall disturbance would be lower in the core and higher in the surrounding areas. The higher levels of activity outside the core area, combined with increased OHV use, could create areas of concentrated disturbance that would increase the potential for surface water degradation.

4.4.2.3 Alternative 1

Impacts resulting from management of heritage resources and special management areas would be the same as impacts common to all alternatives. Implementing management actions for fire, recreation, and wild horses would have impacts on water resources the same as those of the No Action Alternative.

Livestock grazing management could likely have greater impacts on water resources under this alternative than 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. Salt and mineral supplements could be placed within 250 feet of water resources, having a greater potential of subjecting surface waters to increased sediment loads. Livestock water developments would be permitted wherever they enhance livestock production, as

opposed to enhancing livestock distribution as in 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 assist in minimizing adverse impacts.

The least amount of protection would be provided to riparian areas and floodplains from surface disturbing activities under this alternative, which could cause an increase in related impacts. The amount of land area requiring controlled surface use 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 no practicable alternatives are available to place the facility elsewhere, and that appropriate mitigation measures would be implemented. The level of significance of impacts would depend on whether the buffer zones would be large enough to adequately attenuate impacts related to surface disturbing activities.

Additional land area would be open for linear ROWs, 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 would occur, 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 available acreage. 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 could result in greater surface disturbance and related adverse impacts on water resources because of increased potential for exposed soils, erosion, runoff, stream sedimentation, and salt and nutrient loading. The level of significance would depend on the rate and location of development activities and the rate and effectiveness of reclamation.

Benefits to watershed resources from wildlife management actions may not be quite as extensive as compared to other alternatives because of less emphasis and fewer restrictive actions to improve wildlife habitat.

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 and reducing the viewshed of the National Historic Trail Special Recreation Management Area through South Pass would eliminate specific management actions associated with these areas, which would in turn reduce the amount of area subject to surface disturbance restrictions and limitations, potentially reducing benefits to water resources.

Cumulative Impacts. Cumulative impacts would be the same as those described in the No Action Alternative, except impacts would be greatest because of anticipated increases in development, livestock grazing, and other surface disturbing activities, as well as fewer restrictions on such activity.

4.4.2.4 Alternative 2

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

Increased protection would be afforded to heritage resources under this alternative, which could reduce adverse impacts on watershed resources and water quality as compared to 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, adverse impacts on water resources could be reduced as a result of reduced erosion and sedimentation.

The fire management program would have similar impacts on water resources as under the No Action Alternative, except limited fire suppression would be applied to the basin big sagebrush/lemon scurfpea vegetation associations, as opposed to full suppression. Given the inherent disruptive nature of fire suppression efforts, this alternative could cause less erosion and less subsequent sedimentation of surface waters. However, the vegetation association stabilizes the sand dunes, and any exposure and instability of the sand caused by fire could have adverse impacts on the watershed.

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 this greater distance from a riparian area provides any further protection than 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 potentially could benefit water resources through improved planning of such developments. Exclosures would be maintained and new ones constructed as needed to keep livestock out of sensitive riparian areas. This would maintain or improve riparian corridors.

This alternative would provide the most protection to water resources from surface disturbing activities as compared to other alternatives, primarily because a greater amount of land area would be subject to no surface occupancy requirements or ROW exclusion. Any actions that limit the extent of surface disturbing activities would 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 practicable. This larger avoidance area surrounding riparian areas and floodplains could provide considerably more protection to water resources. The increased distance may not be necessary in certain locations or for particular activities, because the likelihood of an adverse impact would be dependent on the size and type of the activity and on topography and drainage patterns of the activity location. Opportunities to construct structures that could enhance watershed resources (e.g., gabions, fences) would be reduced in this alternative. The ecological integrity of the dunal ponds (flockets) would be protected through site-specific management actions, having a beneficial effect on this unique water resource.

It is assumed that the amount of exploration and development that would occur during the planning period would be related to available acreage. 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 could occur, which in turn reduces adverse impacts to watershed resources and water quality.

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 only be allowed 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 to water resources. The amount of area closed to OHV use would increase and thus reduce the potential for accelerated erosion and sedimentation related to OHV use.

Adverse impacts from wild horse management actions could occur to the portion of the Divide Basin Wild Horse HMA located outside the planning area. Under this alternative, the HMA would be reduced, modified to exclude the planning area while maintaining the AML of horses. 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.

Benefits to watershed resources from wildlife management activities would most likely increase under this alternative because of expanded protection and habitat enhancement for wildlife resources.

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 designation of new ACECs and WSAs, would increase the amount of area subject to surface disturbance restrictions and limitations, and thus limit potential adverse impacts resulting from exposed soils and subsequent erosion and runoff into water sources.

Cumulative Impacts. Cumulative impacts would be the same as those described in the No Action Alternative, except impacts would be least extensive because of limitations put on development, livestock grazing, and other surface disturbing activities. The higher levels of activity outside restricted areas, combined with increased OHV use, could create areas of concentrated disturbance that could increase the potential for surface water degradation.

4.4.2.5 Alternative 3

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

Protection would be afforded to heritage resources under this alternative, which could result in reduced adverse impacts on watershed resources and water quality, but not to the extent of Alternative 2. Surface disturbing activities would be limited within an area of 100 feet of most sites eligible for inclusion in the NRHP, thus adverse impacts on water resources may be lessened as a result of reduced erosion and sedimentation. The extent of any impact would depend on the location of the site and proximity to a water source.

Livestock grazing activities could have adverse impacts on water resources similar to those of 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 healthy rangeland standards 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, having a beneficial impact to 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. Topography, drainage patterns, and amount of vegetative cover at a particular salt block location could determine whether the distance of one-quarter-mile from riparian areas would be adequate or excessive to prevent adverse impacts.

This alternative would provide more protection to water resources from surface disturbing activities than the No Action Alternative and Alternative 1, primarily because a greater amount of 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 minimize adverse impacts on surface water sources and recharge areas. Defining the boundaries of ground water recharge areas within the JMH planning area would ensure that appropriate measures would be taken in these locations to protect ground water quantity and quality. Surface disturbance would be controlled within 500 feet to one-quarter mile of riparian areas, wetlands, and 100-year floodplains, but these parameters could vary on a case-by-case basis. Permanent facilities would not be constructed in 100-year floodplains, and linear ROWs would be identified and collocated as practicable.

It is assumed that the amount of mineral development that could occur during the planning period would be related to available acreage. Therefore reducing available acreage (i.e., closing areas to mineral exploration and development) would serve to diminish surface disturbance and subsequently reduce adverse impacts on watershed resources and water quality. Impacts on water resources from mineral development would be similar to impacts described in the No Action Alternative. Although adverse impacts (exposed soils, erosion, and sedimentation) are anticipated in localized areas, the health of watersheds would be one indicator that determines when to limit further development to ensure adverse impacts remain insignificant.

Recreational activities would likely have similar but potentially more extensive impacts on water resources than Alternative 2. This is because measures designed to limit adverse impacts would not be as restrictive. 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 to water resources. The amount of area closed to OHV use or limited to existing roads and trails would be less than Alternative 2, which could increase the potential for soil exposure, accelerated erosion, and increased sedimentation of water sources. The level of significance would depend on the concentration of OHV use in proximity to water sources and watersheds of concern.

Expanding the Divide Basin Wild Horse HMA to include the entire JMH planning area could serve to better distribute wild horses and reduce use on riparian areas within the current HMA. Conversely, this action could cause additional adverse impacts on riparian areas because more riparian areas would be included in the expanded HMA. Introducing wild horse grazing activities to new areas could result in overuse of riparian areas, leading to accelerated erosion and sedimentation of water resources. This effect could be minimized by ensuring that no more than 100 horses would be allowed in the expansion area. However this

would likely not be realized until herd levels reach and maintain the AML, as wild horses currently inhabit areas outside the HMA boundaries.

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

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

Cumulative Impacts. Cumulative impacts would be the same as those described in the No Action Alternative, except impacts would be less extensive because of limitations put on development, livestock grazing, and other surface disturbing activities. Adaptive management strategies would allow the area of disturbance to be shifted over time, with emphasis on development and wildlife needs. Areas with high levels of activity, combined with increased OHV use, could create areas of concentrated disturbance that would increase the potential for surface water degradation. Reclamation of disturbed areas would be the key to reducing overall impacts and allowing the use of the two different areas to be exchanged over time.

4.4.2.6 Preferred Alternative

Management of heritage resources would have an insignificant impact 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 when avoidance of cultural sites directs 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. Moreover, protection measures afforded by the National Historic Preservation Act would further mitigate any 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 protections from surface disturbing activities, thereby reducing adverse impacts to nearby water sources.

Fire could have both beneficial and adverse effects on water resources. Beneficial and adverse impacts could be either short- or long-term depending on fire size and type. Impacts could include increased runoff from exposed soils as well as sedimentation of surface waters. Wildfires usually have more adverse impacts than 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. This could result in long-term adverse impacts by compromising future plant rejuvenation and growth rates. Fire suppression activities could cause increased soil erosion resulting from fire line construction and heavy equipment transport. 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. Prescribed fire burning within prescription areas would generally have a beneficial effect on watershed health by

increasing age and species diversity of plant communities, promoting thicker vegetation growth which could slow erosion rates, and enhancing nutrient cycling. These effects are generally long-term. The minimal amount of proposed prescribed burns (approximately 5,000 acres), and the requirements for 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. This vegetation association helps stabilize the sand dunes and maintains the integrity and stability of the watershed in which it grows.

Livestock grazing could have localized impacts on watershed resources and water quality. Soil compaction and loss of vegetative cover could result in reduced 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. Implementation of healthy rangeland standards, guidelines for livestock grazing, and DPC objectives would help ensure proper management of livestock resources and serve to minimize adverse impacts to watershed resources and water quality.

Certain requirements and mitigation measures for livestock grazing operations would further ensure that impacts are minimized. 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 range improvements generally would be adversely affected because of construction disturbances (particularly for water developments) 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 loads. With proper planning and effective management of range improvements, any 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. This could potentially further 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. Such actions would most likely have a beneficial impact on watershed health and water quality. Prohibiting placement of salt and mineral supplements within 500 feet of riparian areas would minimize soil compaction and subsequent runoff near surface waters.

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 through helping to stabilize stream banks, reduce erosion and sediment yield, promote vegetative cover, and enhance 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 to the resource. Aquatic, wetland, and riparian habitat would not be disposed unless exchanged for lands with equal or greater value (including monetary and functional resource values).

BLM would continue to participate with federal, state, and local government agencies and the Colorado River Salinity Control Forum to develop and implement salinity control plans for the basin, and to maintain existing and future applicable water quality plans.

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 remove vegetation and compact soils, which contributes to increased erosion and subsequent sedimentation of local surface waters. 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. 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 practicable. Controlled use means that surface disturbing activities would avoid these areas unless a site-specific analysis determines that no adverse impacts would occur on water resources. These limitations would ensure that any adverse impacts on water resources would not be significant. Some surface disturbance activities (e.g., reconstruction of crossing, road surfacing, gabions, etc.) may serve to maintain or improve water quality. The adaptive management strategy for mineral development under this alternative would initially preclude some valid existing oil and gas leases from being developed, potentially resulting in less impact than under the No Action Alternative. However because of the uncertainty of the outcome of this adaptive management strategy, the level of long-term impact is not known. The level of significance associated with these activities would be dependent on the amount of area ultimately developed over the planning period.

Ground water could be affected during construction of drill pads or through other exploration and development activities. Improper casing and cementing of wells, undetected spills, or leachate from produced water or mud pits could potentially introduce contaminants to the ground water. Chemicals used for production drilling could cause local contamination of soil and ground water 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 to ground water. Hydrological investigations would be conducted prior to coalbed methane development to determine whether any connection exists 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 methane production could reduce the quantity of ground water contained within affected aquifers because the produced water must be reinjected into aquifers of equal or lower quality. In addition, accidental discharges of produced water onto the ground surface could adversely impact nearby surface water quality. The extent of any impact would depend on the quality of the ground water being discharged. Impacts generally would be greater if the produced water is highly saline.

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 cause localized compaction of soils, reduction of vegetation, and bank instability, which in turn could increase sediment, salt, and nutrient loads from increased runoff. Although camping would be allowed in riparian corridors, areas would be closed if resource damage occurs, thereby preventing adverse impacts from becoming significant. Waste products from recreational activities near riparian areas could have a localized adverse effect on aquatic resources. 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 prior to authorization of special recreation activities. This could reduce impacts on water resources, because such activities would be directed by personnel most familiar with the planning area.

Use of OHVs could have an adverse impact on water resources, especially if OHVs are 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. Riparian areas and 100-year floodplains would be closed to OHV use or OHVs would be limited to existing roads and trails to prevent soil compaction and subsequent runoff. In addition, implementation of OHV designations and educational programs such as the "Tread Lightly" program would further help to reduce adverse impacts to land and water sources.

Vegetation management activities most likely would result in beneficial impacts on watershed resources and water quality. The protective measures afforded to special status plant species and management actions to achieve 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 overall biodiversity. Vegetation manipulation to enhance wildlife habitat would cause adverse short-term impacts to watershed resources by removing vegetation and subsequently increasing erosion and sedimentation; however long-term beneficial impacts could be realized by increasing age and species diversity of plants, promoting thicker vegetative growth to slow erosion, and enhancing nutrient cycling.

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 actions for special 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 Greater Sand Dunes Archeological District. This would increase the amount of area subject to surface disturbance restrictions and limitations and thus limit potential adverse impacts resulting from exposed soils and subsequent erosion and runoff into water sources.

Cumulative Impacts. The potential level of cumulative impact to watershed resources is directly related to the amount, timing, and location of the disturbance in relation to vegetation, soils, and established watercourses. Increased sedimentation could result from any activity that disturbs vegetation, causes soil compaction, or channels overland flows (such as road and well pad construction, livestock trampling, and recreational use, especially OHV activity). Concomitant with loss of vegetative cover and soil loss is increased runoff from denuded surfaces, which could destabilize drainages. Appropriate mitigation and

project design during site-specific analysis could minimize off-site sedimentation but would be dependent on design and maintenance.

Effects to ground water resources would be dependent on the level of activity, quality, and maintenance of wells. Improper casing and cementing of wells, undetected spills, or leachate from produced water or mud pits could potentially introduce contaminants to the ground water. The cumulative impact on ground water aquifers from coalbed methane development cannot be determined because of lack of information. Investigation of aquifers and their possible connections to surface waters prior to development would provide the information necessary to determine cumulative impacts and any necessary mitigation. Containment and reinjection of produced waters that are not suitable and claimed for surface use would reduce the potential for surface water contamination and accelerated erosion in ephemeral channels.

Cumulative impacts could be slightly less extensive than under the No Action Alternative because of limitations on development, livestock grazing, and other surface disturbing activities. Adaptive management strategies would allow the area of disturbance to be shifted over time, with emphasis on multiple uses. Areas with high levels of activity, combined with increased OHV use, could create areas of concentrated disturbance that would increase the potential for surface water degradation. Reclamation of disturbed areas would be the key to reducing overall impacts and allowing the use of the two different areas to be exchanged over time.

4.4.3 Impacts on Wild Horses

BLM has the responsibility to protect, manage, and control wild horses. The wild horse program is responsible for monitoring both the land and the herds, removing excess animals, and preparing animals for adoption. The impacts that implementing wild horse management actions would have on other resources and resource users are discussed in those particular resource sections. This section describes potential impacts on wild horses due to the implementation of management actions of other resource management categories.

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

For analysis purposes, it is assumed there would be a 20 percent annual increase in horse numbers, and gathering would occur approximately every 2 years. The Divide Basin Wild Horse Herd would continue to exceed the AML of 415 to 600 horses over the short term but would ultimately achieve this objective over the long term because of gathering efforts. Therefore the analysis of environmental impacts associated with wild horses is based on the AML rather than the current population level. It is also assumed that approximately 1 acre would be disturbed, and vegetation and forage removed, through constructing and using wild horse traps every 2 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 acreages within HMAs.

Management of heritage resources generally would be low impact, limited to relatively small areas, and not 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 occurs on the 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.

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

Livestock grazing activities could benefit or adversely affect wild horses, as their food source overlaps with that of domestic livestock. However, because of the provisions and restrictions of grazing management actions, the 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. Most range improvements or water developments designed to facilitate livestock management would also benefit wild horses and their management.

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 habitat 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.

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 are adequate to mitigate any potential adverse impact on wild horses due to vegetation removal. Effects from most mineral development would be temporary, as the vegetative conditions on most sites are ultimately reclaimed, and displacement from areas experiencing increased human activity related to mineral development would be anticipated not to be long-term.

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 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 healthy rangeland standards 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 and their habitat by maintaining and improving forage production.

Recreational activities such as camping and hiking would not likely have any impact on wild horses. Some adverse impacts may 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 any forage base, however some temporary displacement of horses may occur.

Implementing wild horse management actions would have an overall benefit to 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.

The protections afforded to special management areas would generally result in beneficial impacts to 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 subsequently increasing forage production. Restrictions on gathering of wild horses in these areas may have minor impacts on the wild horse program. Removing horses from these areas may require that horses be moved a greater distance to access available trap sites.

4.4.3.2 No Action Alternative

Impacts resulting from management of heritage resources, the fire program, recreation, vegetation, wildlife, and special management areas would be the same as impacts common to all alternatives.

Livestock grazing activities would have similar impacts on wild horses as are common to all alternatives. Although livestock operators could increase AUM use to the fully permitted amount, anticipated use of AUMs would continue to be similar to historic levels and 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 would remain adequate for consumption by wild horses.

Management actions for water quality would generally benefit 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 may occur from maintaining and developing riparian exclosures, which would reduce the amount of available forage and limit access to water sources.

Impacts on wild horses from mineral development and other surface disturbances (i.e., ROWs) would include temporary displacement and direct removal of vegetation resources, resulting in a reduction in available forage. The majority of the Divide Basin Wild Horse HMA is currently open to mining claims of some sort, under lease, or would be open to new

leases for oil and gas 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 effects water sources, which could have adverse impacts on the long-term viability of wild horse habitat. It is assumed that the amount of mineral development that could occur during the planning period would be related to available acreage and development potential. Oil and gas development potential within the HMA varies, and thus the amount of available forage that could be removed or disturbed would depend on the level of development that would occur.

Wild horse management actions could provide further benefits 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 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 will not count toward the AML for the Divide Basin HMA, and the need to completely remove them will continue.

Cumulative Impacts. Increasing wildlife objectives could increase competition for forage, which may impact existing use patterns and distribute wild horses into other areas. Development activities are not expected to impact wild horses in the long term, given their adaptability and the low level of actual vegetation removed by development activities. Wild horses will continue to occupy areas outside the existing HMA boundary and as such will be considered "excess," subject to immediate removal. This would continue to complicate wild horse management. Cumulative effects on wild horses are expected to be minimal and insignificant under the No Action Alternative.

4.4.3.3 Alternative 1

Impacts resulting from management of heritage resources, the fire program, recreation, vegetation, and special management areas would be the same as impacts common to all alternatives.

Livestock grazing management actions could have adverse impacts by reducing the amount and quality of forage available to wild horses. 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 are not currently close to using their fully permitted AUMs. 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 adverse impacts on wild horses would depend on the overall condition of the range within the HMA and actual increase in AUM usage. The implementation of healthy rangeland standards and guidelines for livestock grazing would help minimize any adverse impact on forage and water resources.

Watershed management actions would be less restrictive under this alternative, which could reduce and/or increase benefits to wild horses compared to 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.

Although this alternative would provide the greatest opportunity for mineral development which could result in greater losses to forage resources, impacts would be similar to those of the No Action Alternative. The majority of the Divide Basin Wild Horse HMA would be open to mining claims, under lease, or would be open to new leases for oil and gas or linear ROWs for pipelines and communication and transmission lines. Development potential within the HMA varies, and thus the amount of available forage that would be removed or disturbed would depend on the level of development that would occur. The level of development would likely be more under this alternative because of fewer limitations imposed on developers, and thus an adverse impact on wild horses could result if development outpaces reclamation and replacement of habitat. This could also have indirect adverse impacts within the planning area or HMA if wild horses are displaced elsewhere for long periods of time.

Benefits from wildlife management may not be quite as extensive as under the other alternatives because of less restrictive actions to improve wildlife habitat.

Wild horse management actions could provide further benefits by allowing the construction of water developments designed to improve herd distribution and manage forage utilization. The existing wild horse HMA boundary would remain the same. Currently wild horses are using habitat outside the established HMA boundary and will continue to do so. These horses will not count toward the AML for the Divide Basin HMA, and the need to completely remove them will continue. Total removal is not possible, however, as other animals will move into these areas as animals are removed.

Cumulative Impacts. Cumulative impacts would be the same as those described in the No Action Alternative, except impacts could be greater because of further increases of wildlife objectives and potential increased grazing activities. Although development activities are not expected to impact wild horses given their adaptability, the amount of habitat alteration due to development is highest under this alternative and could rise to the level of causing considerable reductions of the current forage base. However, because their ability to move into other areas, cumulative impacts on wild horses are not expected to be significant.

4.4.3.4 Alternative 2

This alternative would reestablish the boundaries of the Divide Basin Wild Horse HMA to exclude the JMH 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 occur, management actions associated with other land and water resources would generally have beneficial impacts to wild horses because of increased protection on 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 causes 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 would subdivide at least two grazing allotments. This could have impacts on livestock grazing use.

Cumulative Impacts. Modifying the Divide Basin HMA boundary to exclude the planning area from the HMA would concentrate horses in a smaller area (that portion of the existing Divide Basin HMA not included within the boundary of the planning area). This could result in increased forage competition among wild horses and with other large ungulates. Given their adaptability and the remaining size of the HMA, cumulative impacts are not expected to be significant.

4.4.3.5 Alternative 3

Impacts resulting from management of heritage resources, the fire program, recreation, vegetation, and wildlife would be the same as impacts common to all alternatives.

Livestock grazing activities could have adverse impacts on wild horses as are common to all alternatives and similar to the No Action Alternative. Although livestock operators could increase AUM use to the fully permitted amount, anticipated use of AUMs would continue to be similar to historic levels and 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. Prohibiting placement of salt and mineral supplements within one-quarter-mile of riparian areas would help ensure that water quality would remain adequate for consumption by wild horses.

Any actions that limit the extent of surface disturbing activities would help minimize adverse impacts on available forage and water sources, having a beneficial impact on wild horses. 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.

Benefits to wild horses from wildlife management activities would most likely increase under this alternative because of expanded protection and habitat enhancement for wildlife resources.

This alternative would expand the Divide Basin Wild Horse HMA to include the entire JMH planning area. This would have an overall beneficial impact by improving wild horse management and providing additional habitat for wild horses. The horses now outside the HMA would be counted against the AML for the HMA, which at present they are not. The “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 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. However, expanding the HMA could also cause adverse impacts by creating additional difficulty in gathering excess horses and assessing herd population size.

Management actions related to special management areas would provide additional benefits for wild horses. Management actions associated with the expansion of existing ACECs, historic viewsheds, and designation of new ACECs and WSAs would increase the amount of area subject to surface disturbance restrictions and limitations and thus protect available forage and water sources.

***Cumulative Impacts*.** Modifying the Divide Basin Wild Horse HMA to include the entire planning area has the potential to distribute horses across a larger area and to decrease forage competition among species. Cumulative effects are expected to be positive and substantial for the wild horses and wild horse management.

4.4.3.6 Preferred Alternative

The management of heritage resources generally would be low impact, limited to relatively small areas, and not 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 occurs on the 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 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 to forage resources.

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

Livestock grazing activities could benefit or adversely affect wild horses, as their food source overlaps with that of domestic livestock. However, because of the provisions and restrictions on 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 continue to be similar to historic levels and 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 potentially further benefit wild horses 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 would remain adequate for consumption by wild horses.

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 habitat 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.

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 help mitigate potential adverse impacts on wild horses due to vegetation removal. Effects from most mineral development would be temporary, as the vegetative conditions of most sites are ultimately 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 effects water sources, which could have adverse impacts on the long-term viability of wild horse habitat.

It is assumed that the amount of mineral development that could occur during the planning period would be related to available acreage and development potential. Oil and gas development potential within the HMA varies, and thus the amount of available forage that could be removed or disturbed would depend on the level of development that would occur. The adaptive management strategy for mineral development under this alternative initially would preclude some valid existing oil and gas leases from being developed, potentially resulting in less impact than under the No Action Alternative. However, because of the uncertainty of the outcome of this adaptive management strategy, the level of long-term impacts is unknown. The level of significance associated with these activities would be dependent on the amount of area ultimately developed over the planning period.

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 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 also would benefit wild horses by reducing competition with native plants, consequently maximizing forage production. Implementation of healthy rangeland standards 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 and their habitat by maintaining and improving forage production.

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.

Implementing wild horse management actions would have an overall benefit to 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. 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 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 HMA, and the need to completely remove them will continue.

Management actions for special management areas would generally result in beneficial impacts to 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 subsequently increasing forage production. Restrictions on gathering of wild horses in these areas may have minor impacts on the wild horse program. Removing horses from these areas may require that horses be moved a greater distance to access available trap sites. These impacts would slightly greater than under the No Action Alternative because of implementation of management actions associated with the additional of a special management area.

Cumulative Impacts. Increasing wildlife objectives could increase competition for forage, which may impact existing use patterns and distribute wild horses into other areas. Development activities are not expected to impact wild horses in the long term, given their adaptability and the low level of actual vegetation removed by development activities. Wild horses will continue to occupy areas outside the existing HMA boundary and as such will be considered "excess," subject to immediate removal. This would continue to complicate wild horse management. Cumulative effects on wild horses are expected to be minimal and insignificant under the Preferred Alternative.

4.4.4 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. The impacts that implementing livestock grazing management actions would have on other resources and resource users are discussed in those particular resource sections. This section describes potential impacts on livestock grazing operations due to implementation of management actions for other resource management categories. Implementing resource management actions would not have direct environmental impacts on livestock grazing but would generally have indirect, nonenvironmental impacts on livestock operators.

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

It is assumed that livestock grazing would occur throughout the entire JMH CAP planning area. Anticipated grazing use is assumed to increase over the planning period to the fully permitted active use amount (26,830 AUMs) under Alternative 1 but to 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 similar for all areas and therefore are not discussed separately. The rate of revegetation of disturbed areas varies 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 revegetate upon abandonment. Except for 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.

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 are 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 may occur because of restrictions on surface disturbing activities near heritage sites, which may 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.

Both wildland and prescribed fires would have short-term impacts on livestock grazing because of a 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, as 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 season of use.

Implementation of livestock grazing management actions could have both beneficial and adverse impacts on livestock operators. Most impacts would occur from adjustments for the purposes of complying with healthy rangeland standards. 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 grazers. Restrictions on salt and mineral placement could require additional planning and effort but would distribute forage use and reduce impacts to other resources including water sources. Livestock grazing management could also benefit from distribution of livestock and the maintenance or improvement of vegetation. This would increase available forage and help achieve healthy rangelands.

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 the need to remove livestock from allotments and/or pastures or from construction of riparian exclosures in order to achieve a healthy rangeland standard.

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 (i.e., result in loss of forage resources). Standards for reclamation of linear surface disturbances are adequate to mitigate any adverse impact related to short-term vegetation removal. Effects from most mineral development would be short-term, as the vegetation conditions on most sites ultimately would be reclaimed. Salable mineral activity would not be expected to have any affect on livestock grazing management because of the limited activity and limited area of vegetation removal. Any mineral withdrawals would prevent vegetation removal and a potential subsequent decrease in the forage base.

Vegetation management activities most likely would most 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 cause short-term effects to livestock grazing 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 livestock by reducing competition with native plants, 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 over 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 may require some livestock operators to alter grazing management practices to comply with healthy rangeland standards. 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 because of the expectation that the elk population size in this area would not change considerably. Achieving wildlife population objectives (section 4.4.6, wildlife assumptions) and implementing the various management options offered to livestock operators would help to minimize effects. Further effects could occur if management actions result in increased wildlife populations, which could reduce available forage for livestock. It is unlikely that this would occur with Wyoming Game and Fish Department (WGFD) efforts to maintain objectives.

Recreational activities likely would not impact livestock grazing activities, other than from limited human disturbance. Some impacts may 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 stays within authorized areas. However, unauthorized OHV activity could affect livestock grazing by damaging vegetation resources and consequently reducing available forage.

Activities in special management areas could have both beneficial and adverse impacts to 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 subsequently increasing forage production.

4.4.4.2 No Action Alternative

Impacts resulting from management of heritage resources, recreation, vegetation, wildlife, and special management areas would be the same as impacts common to all alternatives.

Fire management activities would have similar impacts on livestock grazing as described for impacts common to all alternatives. Full fire suppression for basin big sagebrush/lemon scurfpea vegetation associations could result in short-term impacts on livestock grazing through loss of plant diversity. This vegetation association stabilizes the sandy soils in this area of JMH 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.

Management actions for livestock grazing would allow operators the flexibility to manage livestock in a manner that would not adversely impact other resources. Although livestock operators could increase AUM use to the fully permitted amount, anticipated use of AUMs

would continue to be similar to historic levels and 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 require additional planning when constructing such developments, but would improve long-term forage production and prevent overuse of vegetation resources. Similarly, more planning and effort may be required of livestock operators to comply with 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 healthy rangelands.

Effects from watershed management actions would be similar to 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 water quality impacts could be mitigated). Riparian exclosures could also affect grazing activities by reducing the amount of available forage for livestock, as 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.

Impacts from mineral exploration and development and from other surface disturbances in support of these activities (e.g., ROWs) would include removal of vegetation resources and therefore 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 available acreage. Therefore reducing available acreage (i.e., closing or withdrawing areas to mineral development) would serve to diminish development activity and subsequently 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 aid in mitigating impacts on livestock grazing related to vegetation removal

Effects from wildlife management on livestock grazing would be similar to impacts common to all alternatives. Competition between big game and livestock over 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 as compared to the other alternatives.

Similar to wildlife, wild horse management activities could result in effects on livestock grazing because of competition over forage resources. However, achieving and 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.

Approximately 9,346 AUMs within the JMH 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.

Cumulative Impacts. Reductions in the forage base due to development and other surface disturbing activities, combined with competition for forage resources, would result in cumulative impacts to livestock grazing. This could increase the cost of operations for some operators and possibly reduce the ability to meet the Wyoming Standards for Healthy Rangelands, which could in turn place additional restrictions on livestock grazing (possible short-term reduction in use). Impacts could occur in the short term by limiting grazing to achieve rangeland standards but would be reduced in the long term because of improved rangeland health.

4.4.4.3 Alternative 1

Impacts resulting from management of heritage resources, recreation, and vegetation would be the same as impacts common to all alternatives. Impacts on livestock grazing from the fire management program and wild horses would be the same as those of the No Action Alternative.

Livestock grazing management actions under this alternative generally would benefit operators by allowing for 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 if operators are required to reduce their AUMs to achieve healthy rangeland standards.

Watershed management actions would be less restrictive under this alternative. 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. In addition, the removal of riparian exclosures would increase available forage for livestock.

This alternative provides the greatest opportunity for mineral development and production, which would result in greater losses to forage resources. 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 could result in greater surface disturbance that 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 any adverse impact on livestock grazing related to vegetation removal. Effects from most mineral development would be temporary, as the vegetation conditions on most sites ultimately would be reclaimed. However, an adverse impact on grazing could result if development outpaces reclamation and replacement of forage.

Effects from wildlife management on livestock grazing would be similar to impacts common to all alternatives. The beneficial impacts may not be quite as extensive as under the other alternatives because of less restrictive actions to improve wildlife habitat that subsequently benefits livestock grazing. Animal damage control activities under this alternative could directly benefit livestock operations by removing animals known to have killed livestock.

Competition between big game and livestock over 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, it is anticipated that the elk population objective would be increased to 1,200, which could slightly increase the competition between livestock and wildlife over forage resources. An additional 1,513 AUMs would be required to support the augmented elk population objective—an insignificant increase 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 larger populations of big game that inhabit this area (Map 51).

Approximately 10,860 AUMs within the JMH 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 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. Utilizing the 26,830 AUMs permitted for livestock, coupled with wildlife use levels, could degrade forage resources on some allotments and subsequently jeopardize compliance with healthy rangeland standards. This could result in significant impacts to livestock grazing activities if operators are required to reduce their AUMs. Implementing appropriate actions for livestock grazing management may be necessary. 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. This could likely result in a reduction of AUMs for livestock but would not be implemented unless it were the only appropriate action for meeting healthy rangeland standards.

Management activities related to special management areas could reduce effects on livestock grazing by eliminating certain management actions which restrict livestock grazing with the removal of the ACEC designation for Steamboat Mountain and the reduction of the viewshed associated with the National Historic Trail Special Recreation Management Area through South Pass. This would reduce the amount of area subject to surface disturbance restrictions and limitations.

Cumulative Impacts. Cumulative impacts would be the same as those described in the No Action Alternative, except impacts could be greater and possibly significant. Increased development, livestock grazing, and competition over forage resources could increase cumulative impacts given that adequate forage would be provided for wildlife. This could tax forage resources and jeopardize rangeland standards. Impacts would be significant if operators are forced to reduce AUMs in the long term to meet rangeland standards. Decreased grazing restrictions and additional provisions afforded to livestock operators under this alternative could help to offset impacts and reduce the cost of operations.

4.4.4.4 Alternative 2

Effects resulting from management of vegetation resources would be the same as impacts common to all alternatives.

Increased protection would be afforded to heritage resources under this alternative, which could have both beneficial and adverse impacts on livestock grazing as compared to 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.

Fire management actions would have effects on livestock grazing similar to those of 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.

The increased restrictions placed on livestock grazing activities under this alternative would likely cause greater adverse effects on livestock operators 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. Requiring that modified turnout dates be the primary method for meeting healthy rangeland standards could increase costs for livestock operators who are 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 possibly would increase related costs. Whether the greater distance from these areas provides any further protection than 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 may preclude their construction in some cases, thereby reducing the extent of forage and water accessible by livestock.

Watershed management actions would be more restrictive under this alternative. This would benefit forage conditions but could affect some grazing management activities. Although increasing the amount of area designated as avoidance or no surface occupancy would help prevent destruction of vegetation resources, it would also preclude construction of water developments and range improvements designed to facilitate livestock grazing operations. Surface disturbing activities would avoid an area within 500 feet to one-quarter-mile of riparian areas. Riparian exclosures would also impact grazing activities by reducing the amount of available forage for livestock, as 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 provides the least opportunity for mineral exploration and development, which would minimize related losses to 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, as the vegetation conditions on most sites are ultimately reclaimed. However, an effect on grazing could result if development outpaces reclamation and replacement of forage.

Management actions for wildlife under this alternative could likely provide greater beneficial effects on livestock grazing, as expanded protection and enhancement measures for wildlife resources would limit surface disturbance, human disruption, and improve forage conditions. However these actions could also increase wildlife populations, potentially reducing available forage for livestock. Such impacts would only occur if WGFD efforts to maintain wildlife

population objectives were not adequately employed. Overall effects on livestock grazing could be slightly greater than under the No Action Alternative because it is anticipated that the elk population objective would be increased to 1,200. This would require an increase of 1,513 AUMs for elk, an insignificant increase when compared to the available forage of the total planning area. Animal damage control for livestock protection would be by nonlethal methods, or by lethal methods only if wildlife would benefit. This could have effects on livestock operations if removing animals known to have killed livestock is not as efficient.

Approximately 10,860 AUMs within the JMH 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 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 alternative would reestablish the boundaries of the Divide Basin Wild Horse HMA to exclude the JMH 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.

Managing 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 monitor concentration of use, limit camping along streams, and reduce compaction of vegetation and soils. The amount of area closed to OHV use or restricted to designated areas would increase and thus would reduce the potential for damage to forage resources. Withdrawing the planning area from recreational mining use would eliminate related surface disturbance and forage losses. However the likelihood that this activity would disturb a significant area of available forage is negligible.

Actions related to special management areas under this alternative could have a greater effect on livestock grazing. Management actions associated with expansion of existing ACECs and historic viewsheds, and designation of new ACECs, WSAs, and research natural areas would increase the amount of area subject to surface disturbance restrictions and limitations and thus would 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.

Cumulative Impacts. Increased restrictions on livestock grazing under this alternative likely could increase the cost of operations and possibly shorten the grazing season for some operators. Impacts could be significant in the short term if operators are forced to reduce AUMs to meet rangeland standards. These effects likely would be reduced in the long term because of improved rangeland health and increased ability to meet rangeland standards. Anticipated decreases in development could offset impacts caused by forage reduction, as compared to the No Action Alternative and Alternative 1.

4.4.4.5 Alternative 3

Effects resulting from management of heritage resources and vegetation would be the same as impacts common to all alternatives. Impacts on livestock grazing from the fire management program would be the same as those of the No Action Alternative.

Livestock grazing management actions under this alternative would affect livestock operators similar to such actions under the No Action Alternative. Although livestock operators could increase AUM use to the fully permitted amount, anticipated use of AUMs would continue to be similar to historic levels and 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 ensure that water quality remains adequate. 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.

Watershed management actions would affect livestock grazing similar to such actions under the No Action Alternative. Surface disturbance would be limited within 500 feet to one-quarter-mile of riparian areas and other water resources and thus 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, as the exclosures would be closed to grazing.

Impacts from mineral exploration and development, and from other surface disturbances in support of these activities (e.g., ROWs), would be similar to those of the No Action Alternative. The amount of surface disturbance associated with 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 livestock grazing when compared to the size of the planning area. Standards for reclamation of linear surface disturbances would help mitigate any affect on livestock grazing related to vegetation removal. Effects from most mineral development would be temporary, as the vegetation conditions on most sites ultimately would be reclaimed. Effects to grazing could result if development outpaces reclamation and replacement of forage.

Management actions for wildlife would have impacts on livestock grazing similar to those of Alternative 2 but not as great. Expanded protection and enhancement measures for wildlife resources would limit surface disturbance and improve forage conditions but could also increase wildlife populations and thereby potentially reduce 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 it is anticipated that the elk population objective would be increased to 1,200. This would require an increase of 1,513 AUMs for elk, an insignificant increase 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 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 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 alternative would expand the boundaries of the Divide Basin Wild Horse HMA to include the entire JMH planning area, and would serve to better distribute wild horses, possibly reducing the competition between livestock and wild horses over 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 reach and maintain the AML.

Recreational management actions would affect livestock grazing similar to such actions 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 monitor concentration of use, limit camping along streams, and reduce compaction of vegetation and soils. Areas closed to OHV use or where OHV use is restricted 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 would be negligible from this type of activity.

Effects related to management actions associated with special management areas would be similar to those of Alternative 2 but not as great. Management actions associated with fewer expansions and designations of special management areas under this alternative would result in fewer actions that place limitations and restrictions on surface disturbing activities.

Cumulative Impacts. Cumulative impacts would be the same as those described in Alternative 2, except impacts would likely be less extensive because of fewer grazing restrictions. Short-term impacts could occur but are not expected to be significant.

4.4.4.6 Preferred Alternative

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 are 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 may occur because of restrictions on surface disturbing activities near heritage sites, which may 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. 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 to forage resources.

Both wildland and prescribed fires would have short-term impacts on livestock grazing because of a 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 grazing, as 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 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 loss of plant diversity. This vegetation association stabilizes the sandy soils in this area of JMH and provides habitat and forage primarily for wildlife. Due to the relatively limited extent of these vegetation associations, impacts on livestock grazing would not be significant.

Implementation of livestock grazing management actions could have both beneficial and adverse impacts on livestock operators. Most impacts would occur from adjustments for the purposes of complying with healthy rangeland standards. Such adjustments could include modified turnout dates, shorter grazing periods, growing season rest, riparian exclosures, forage utilization levels, and livestock conversions. While 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, 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 require additional planning when constructing such developments, but would improve long-term forage production and prevent overuse of vegetation resources. Within sensitive wildlife habitat, livestock water developments would only be allowed if resource conditions were improved. This could further improve construction planning of such developments. Salt and mineral placement (prohibited within 500 feet of riparian habitat, historic trails and special status species habitat) could require additional planning and effort, but would distribute forage use and reduce adverse impacts to rangeland resources. Livestock grazing management could also benefit from distribution of livestock and the maintenance or improvement of vegetation. This would help achieve healthy rangelands.

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 water quality impacts 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.

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 removes vegetation (i.e., loss of forage

resources). Standards for reclamation of linear surface disturbances would help to mitigate potential, adverse impacts on livestock grazing due to short-term vegetation removal. Effects from most mineral development would be short-term, as the vegetation conditions on most sites are ultimately reclaimed. Salable mineral activity is not expected to have any affect on livestock grazing management because of the limited activity and limited area of vegetation removal. Any mineral withdrawals would prevent vegetation removal and a potential subsequent decrease in the forage base.

It is assumed that the amount of mineral development that could occur during the planning period would be related to available acreage. The adaptive management strategy for mineral development under this alternative would initially preclude existing oil and gas leases from being developed, potentially resulting in less impact than under the No Action Alternative. However, due to the uncertainty of the outcome of this adaptive management strategy, long-term impacts may be the same or possibly greater than under the No Action Alternative. The level of impact associated with these activities would be dependent on the amount of area ultimately developed over the planning period but is not expected to be significant as the goals and objectives for this alternative would be met through the adaptive management strategy.

Vegetation management activities would most likely result in beneficial affects 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 cause short-term effects to livestock grazing through vegetation removal, but long-term benefits would be realized due to enhanced forage production. Preventing and controlling the spread of invasive plant species would also benefit livestock by reducing competition with native plants, 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 due to the inherent competition between big game species and livestock over 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 may require some livestock operators to alter grazing management practices to comply with healthy rangeland standards. 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 due to the expectation that the elk population size in this area would not change considerably. Achieving wildlife population objectives (section 4.4.6) and implementing the various management options offered to livestock operators would help to minimize effects. Further effects could occur if management actions result in increased wildlife populations, which could reduce available forage for livestock. It is unlikely that this would occur with WGFD efforts to maintain objectives. Overall adverse impacts could be

slightly greater than under the No Action Alternative, because it is anticipated that the elk population objective would be increased to 1,200. This would require an increase of 1,513 AUMs for elk, an insignificant increase when compared to the available forage of the total planning area.

Recreational activities likely would not impact livestock grazing activities other than from limited human disturbance. Some impacts may 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 stays within authorized areas. However, unauthorized OHV activity could affect livestock grazing by damaging vegetation resources and consequently reducing available forage.

Similar to those of wildlife, wild horse management activities could result in effects on livestock grazing because of competition over forage resources. However, achieving and 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.

Approximately 9,346 AUMs within the JMH 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.

The protections afforded to special management areas would generally benefit livestock grazing. Protections aimed at conserving sensitive vegetation communities, and limitations on mineral development and other surface disturbing activities, would benefit livestock grazing by enhancing overall vegetation conditions and subsequently increasing forage production. These effects would most likely be greater than under the No Action Alternative because of implementation of management actions associated with additional designations of special management areas.

Cumulative Impacts. Reductions in the forage base due to development and other surface disturbing activities, combined with competition for forage resources, would result in cumulative impacts to livestock grazing. This could increase the cost of operations for some operators and possibly reduce the ability to meet the Wyoming Standards for Healthy Rangelands, which could in turn place additional restrictions on livestock grazing (possible short-term reduction in use). Impacts could occur in the short term by limiting grazing to achieve rangeland standards but would be reduced in the long term because of improved rangeland health.

Impacts due to development activity and subsequent forage loss could be reduced as compared to the No Action Alternative because of staged development activity. However, competition over forage resources with other grazing animals would increase slightly over the No Action Alternative because of further increases in wildlife objectives.

4.4.5 Impacts on Vegetation Management

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 status species, state species of concern, rare plant communities and associations, and noxious weeds. The effects that implementing vegetation management actions have on other resources and resource users are discussed in those particular resource sections. This section describes potential impact on vegetation resources due to the implementation of management actions for other resource management categories.

Effects to vegetation would be considered significant if the viability of protected plant species were jeopardized, with little likelihood of reestablishment after disturbance, or 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 the population is sufficiently large or resilient to respond to disturbance without a measurable change. The impact would be significant if reclaimed areas do not attain adequate vegetation ground cover and species composition to stabilize the site within 5 years from disturbance, or there is invasion and establishment of noxious weeds that contribute to unsuccessful revegetation. The significance of an impact is also dependent 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 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 create a vegetative landscape similar to adjacent lands in excess of 20 years. Adequate forage is assumed available for current wildlife objective numbers, and it is assumed that all management actions associated with the protection of wildlife habitat and cultural resources have a direct benefit to vegetation management. All surface disturbing activities would require reclamation as per 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 to 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, then management actions would be taken to improve the conditions of native vegetation.

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

Wildfires usually have more adverse impacts than prescribed burns, because wildfires generally cover larger areas and remove more vegetation, and if burning outside established prescription, they often burn with enough heat to adversely affect soil organisms as well as kill the root system of some plants. 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, promoting thicker vegetation growth, and enhancing nutrient cycling.

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.

Watershed management would provide benefits to native vegetation by maintaining or restoring healthy and diverse plant communities through the establishment of DPC objectives, buffer zones placed 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 over half of the planning area and may cause adverse impacts to vegetation because of a lack of requirements for mitigation that protect vegetation resources. This has the potential for significant effects to vegetation, with the severity of the effects dependent on the amount of activity and the success of reclamation efforts for disturbed areas.

Surface disturbance associated with livestock water developments or mineral activities other than oil and gas would account for approximately 122 acres of disturbance to vegetation (oil and gas surface disturbance is detailed under each alternative discussion). This total accounts for 6 acres (worst case) disturbed during construction of livestock water developments (assuming 1 acre per development), 53 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.

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 habitat for colonization and expansion of special status 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 are not implemented and monitored to insure successful revegetation.

4.4.5.2 No Action Alternative

The management of heritage sites would indirectly benefit vegetation through preservation of possible rare and sensitive plant communities as well as general vegetation characteristics, but any impact would generally be limited to relatively small areas. Even under the most intense management (i.e., excavation), the amount of vegetation disturbed would be very small.

Both wildland and prescribed fires could have short-term localized impacts on vegetation, however the long-term effect of fire would be improved forage production capacity and 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 and livestock/wildlife forage on rangelands. Wildfires usually occur in the high-density sagebrush, juniper, conifer, and aspen communities. Within 3 years, livestock and wildlife forage would generally exceed original levels in some vegetation types, as grasses and forbs replace 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 to these species from crushing or removal.

Fire within the basin big sagebrush/lemon scurfpea community would be adverse because of the unlikely reestablishment 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 that stabilizes the sandy soils in this area of JMH and provides habitat and forage primarily for wildlife.

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 on 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. Should resource damage occur, those areas would be closed to camping to minimize long-term adverse impacts. Adverse effects of recreational mining would be minimal because of the small amount of 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.

The vegetation communities likely affected by livestock grazing would include the saltbush, low-density sagebrush, high-density sagebrush, aspen, riparian, and grassland communities. Livestock allotment management plans (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 produce little or no forage value. Implementation of healthy rangeland standards and guidelines for livestock grazing would ensure the viability of vegetation resources.

Water developments would affect vegetation. Areas around existing water sources receive more use than the adjacent uplands, with increased bare ground, weed invasion, and soil erosion. This would continue in the long term as new waters are developed.

Fencing would be used to manage livestock grazing to improve forage and habitat condition on upland and wetland sites. Range condition should improve on localized areas where fences are used to implement grazing management plans or 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 encourage the invasion and growth of noxious weeds. Early spring grazing would also have adverse impact on range grass and forb species by the 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 healthy rangeland standards and guidelines.

Watershed management would provide benefits to native vegetation by maintaining or restoring healthy and diverse plant communities through the establishment of DPC objectives, buffer zones placed 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.

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 weeds. 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. This impact could be significant if the amount of vegetation lost is of a type that is 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 if reclamation would be successful, some original plant communities, particularly shrub communities and stabilized sand dunes, would not likely be reestablished to the same structure and density of predisturbance conditions 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 controlling surface use or by no surface occupancy requirements, preserving the

character of vegetation communities. Disturbed sites would be monitored for effective reclamation, and linear ROWs would avoid sensitive status species locations. Effects from most mineral development would be temporary, as the vegetation conditions on most sites are ultimately reclaimed. An adverse impact on vegetation could result if development outpaces reclamation and reestablishment of vegetation.

Constructing wells or access roads in stabilized dunes would cause direct loss of anchoring vegetation, creating active dunes that may 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, development, and mineral material sales. Approximately half 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. These areas would be closed to mineral material sales through the closure of the Greater Sand Dunes ACEC, Steamboat Mountain ACEC, and the Sand Dunes WSA. Some of the rare aspen communities would also be closed to mineral material sales through the closure of South Pass Summit. The areas subject to mineral activity could result in direct removal of shrubs and trees, causing adverse long-term effects to 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 cause adverse long-term effects because of direct removal of these communities and long-term reclamation periods. However, it would be unlikely that any 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 to native vegetation that, 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, as they have the highest use of traffic to and from the planning area.

One of the two federally listed plant species potentially occurring within the planning area, the Ute ladies'-tresses, may be affected by management actions but would likely not be adversely affected. Plant species may be affected because of the amount of surface disturbance associated with management of the planning area, however no adverse effects would occur because of required surveys for threatened and endangered species prior to surface disturbance activities and subsequent protection measures developed by BLM in conjunction with the U.S. Fish and Wildlife Service (FWS) should a species be found. There would be no effect to the blowout penstemon from management of the planning area because of the unlikely occurrence of the plant in the planning area.

Potential habitats of Wyoming BLM sensitive species would require searches for the species prior to approval of any project or activity. Known locations of these communities would be protected and closed or withdrawn from OHV use, surface disturbance and disruptive

activities, locatable mineral development, mineral material sales, and coal and sodium exploration. Special status 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, therefore it is likely that overall adverse effects could occur if habitat is disturbed during development.

Cumulative Impacts. Cumulative effects to vegetation would result from mineral development, livestock grazing, and other surface disturbing activities but would depend on the amount and timing of activities and whether the amount of activity in the planning area outpaces the success of reclamation efforts in disturbed areas. Impacts are not likely to be significant because of the varied spacing of activities, however they are likely to be long-term, even with successful reclamation, because some native shrub plant communities require 20 to 30 years to reestablish to predisturbance conditions. Restrictions on surface use, implementation of healthy rangeland standards and desired plant community objectives, and monitoring efforts would provide protection to vegetation resources and help reduce cumulative impacts. Additional protection would be given to special status plants under the ESA and BLM Sensitive Species guidance, which would further reduce potential cumulative impacts.

4.4.5.3 Alternative 1

Impacts resulting from management of heritage resources, the fire program, and vegetation resources would be the same as impacts common to all alternatives and similar to the No Action Alternative.

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

Livestock grazing management actions under this alternative could have greater adverse impacts on vegetation resources than 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 is 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 benefit commodity uses. This has the potential to adversely effect vegetation through overuse of particular areas. Less restrictive measures for range improvements, water developments, and salt and mineral placement could limit protections on vegetation resources. Full implementation of these management actions could cause some difficulty in allotments meeting healthy rangeland standards.

The effects of watershed management actions would be the same as those of the No Action Alternative, except these beneficial impacts would be greatly reduced because of fewer

restrictions on surface disturbing activities and smaller buffer zones around riparian areas and floodplains.

The effects of surface disturbing activities on vegetation resources for development and ROWs are expected to be similar to those of the No Action Alternative, however adverse impacts would likely be greater because of increased development and decreased restrictions. 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).

The planning area would be open for new 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 represents an insignificant impact on vegetation when compared to the size of the planning area. This impact could be significant if the amount of vegetation lost is of a type that is not abundant within the planning area. The impacts on vegetation would be similar to those of the No Action Alternative. A significant adverse impact on vegetation could result if development outpaces 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 to all vegetation communities are expected to be much greater than under the No Action Alternative because of the increased amount of 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, similar to the No Acton Alternative, however it would be unlikely that any development would take place during the planning period because of projected demand.

Management activities related to special management areas could reduce beneficial impacts to vegetation resources compared to the No Action Alternative by eliminating certain management actions in the Steamboat Mountain ACEC, by the removal of the ACEC designation for Steamboat Mountain, and by the reduction of the viewshed associated with the National Historic Trail Special Recreation Management Area through South Pass. The vegetation communities in the Steamboat Mountain area would be the most affected. This would allow more surface disturbance, potentially reducing benefits on vegetation resources.

Potential habitats of BLM sensitive species would require searches for the species before approval of any project or activity, similar to the No Action Alternative. Known locations of these communities would be protected and closed or withdrawn from OHV use, locatable mineral development, mineral material sales, and ROWs. New leases would contain stipulations that protect these communities. Overall, adverse effects to special status plant species could be significant because of the lack of protection of these communities from fluid mineral activities, geophysical exploration, and coal and sodium exploration.

Cumulative Impacts. Cumulative impacts would be the same as those described in the No Action Alternative, except that impacts would be greatest under this alternative because of anticipated increases in development activity and livestock grazing and decreased restrictions on surface disturbance. Impacts are likely to be significant if activities occur in sensitive plant communities.

4.4.5.4 Alternative 2

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

Vegetation treatments including prescribed burns 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 for basin big sagebrush/lemon scurfpea vegetation associations would be applied, but this could have an adverse effect on vegetation. This vegetation association stabilizes the sandy soils in this area of JMH, and the reestablishment of the association in these soil conditions within a few years after a fire would be unlikely.

The adverse effects of OHV use and other recreational activities would be less under this alternative than under the No Action Alternative because of increased restrictions on use in the planning area and decreased development, 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 to rare and sensitive plant communities and riparian areas.

The increased restrictions placed 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 meeting the Wyoming Standards for Healthy Rangelands could have beneficial effects to 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 possibly increase related costs. Whether the greater distance from these areas provides any further protection to vegetation than some shorter distance could 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 preserve sensitive resources or improve habitat and resource conditions, having a beneficial impact on vegetation resources.

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.

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 development and ROWs are expected to be much less than under the No Action Alternative because of increased restrictions (controlled surface use or no surface occupancy requirements) and decreased development. 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 could 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 the designation of the Greater Sand Dunes ACEC, the

connectivity area, and Steamboat Mountain ACEC as avoidance areas (Map 28). Other areas important to rare and sensitive plant communities would be ROW exclusion areas and include the WSAs and the paleosol deposition area. Effects from most mineral development would be temporary, as the vegetation conditions on most sites are ultimately reclaimed. However an adverse impact on vegetation could result if development outpaces reclamation and replacement of forage, or the amount of a particular type of vegetation is small in comparison to other vegetation in the planning area.

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

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

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 introduce or aid in spreading the species in the planning area.

Actions related to special management areas could have a greater beneficial impact on vegetation resources under this alternative. Management actions associated with the addition of the paleosol deposition area to the Greater Sand Dunes ACEC and Indian Gap, the face of Steamboat Mountain, and the area where elk crucial habitat and birthing areas overlap to Steamboat Mountain ACEC, would benefit rare and sensitive plant communities through further restrictions on activities within these sensitive areas (Map 37). Management actions associated with designating special status plant species habitat and the cushion plant community as ACECs, and designation of the New Pinnacles WSA, would also benefit and protect these communities from disturbance.

Management actions associated with 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.

Potential habitats of Wyoming BLM sensitive species would require searches for the species prior to approval of any project or activity. 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 in the No Action Alternative, however new leases would contain stipulations that protect these communities. Overall, impacts to special status plant species could occur on existing leases, but these should be reduced somewhat through application of conditions of approval designed to meet the Rangeland Standards.

Cumulative Impacts. Cumulative impacts would be the same as those described in the No Action Alternative, except impacts would be least extensive under this alternative because of anticipated decreases in development activity and livestock grazing and increased restrictions on surface disturbance.

4.4.5.5 Alternative 3

Impacts of weed infestations from surface disturbing activities and impacts resulting from management of heritage resources would be the same as those common to all alternatives, and similar to 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 being 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 this area of JMH. Reestablishment of this association in these soil conditions within a few years after a fire would be unlikely.

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 on additional areas designated as ACECs and WSAs. More area of OHV use would be limited to designated roads and trails, further reducing access to portions of the planning area (Map 41). Camping would be allowed only in designated areas, decreasing adverse effects to rare and sensitive plant communities and riparian areas. Recreation 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.

Livestock grazing management action under this alternative would have impacts on vegetation similar to those of the No Action Alternative. Although livestock operators could increase AUM use to the fully permitted amount, anticipated use of AUMs would continue to be similar to historic levels and not result in any additional grazing pressure on available forage. Construction and maintenance of livestock range improvements and water developments would be 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.

The effects of watershed management actions would be the same as 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.

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 and WSAs. Adverse impacts to sensitive plant communities would be reduced by the designation of the Greater Sand Dunes ACEC as an avoidance area and the WSAs and 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 of 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.

The amount of surface disturbance associated with 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 to vegetation types would depend on the location of the development and the vegetation type affected. Standards for reclamation of linear surface disturbances mitigate any potential impact to vegetation removal. Effects from most mineral development would be temporary, as the vegetation conditions on most sites are ultimately reclaimed. An adverse impact on vegetation could result if development outpaces reclamation and replacement of forage.

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

A large portion of the planning area would be open to locatable mineral activity (Map 45). Adverse effects to all vegetation communities would be much greater than under the No Action Alternative because of the increased amount of area available to development.

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 to 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 to these vegetative communities, any impact likely would not be significant because the demand for this resource in this particular area is negligible.

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

Potential habitats of Wyoming BLM sensitive species would require searches for the species prior to approval of any project or activity. 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 in the No Action Alternative, however new leases would contain stipulations that protect Wyoming BLM sensitive species' communities. Overall, adverse effects to special status plant species could be high depending on the extent and location of the disturbance because of the lack of protection of these communities from existing fluid mineral leases.

Cumulative Impacts. Cumulative impacts would be the same as those described in the No Action Alternative, except impacts would be less extensive because of anticipated decreases in development activity and livestock grazing, increased restrictions on surface disturbance, and implementation of adaptive management strategies.

4.4.5.6 Preferred Alternative

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 are designed to maintain and enhance native vegetation and promote healthy watersheds, negative impacts to 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, then management actions would be taken to improve the conditions of native vegetation.

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

Wildfires usually have more adverse impacts than prescribed burns because wildfires generally cover larger areas and remove more vegetation, and if burning outside established prescription, they often burn with enough heat to adversely affect soil organisms as well as kill the root system of some plants. 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, promoting thicker vegetation growth, and enhancing nutrient cycling.

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. The addition of the West Sand Dunes Archeological District would likely reduce adverse effects on vegetation through management prescriptions that limit surface disturbing and disruptive activities within special management areas.

Watershed management would provide benefits to native vegetation by maintaining or restoring healthy and diverse plant communities through the establishment of DPC objectives, buffer zones placed 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.

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 habitat for colonization

and expansion of special status 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 possible rare and sensitive plant communities as well as general vegetation characteristics, but any impact generally would be limited to relatively small areas. Even under the most intense management (i.e., excavation), the amount of vegetation disturbed would be very small.

Both wildland and prescribed fires could have short-term localized impacts on vegetation, however the long-term effect of fire would be improved forage production capacity and 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 and livestock/wildlife forage. Wildfires usually occur in the high-density sagebrush, juniper, conifer, and aspen communities. Within 3 years, livestock and wildlife forage would generally exceed original levels in some vegetation types, as grasses and forbs replace 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 to these species from crushing or removal.

Fire within the basin big sagebrush/lemon scurfpea community would be adverse because of the unlikely reestablishment 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 area of JMH and provides habitat and forage primarily for wildlife.

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 on 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. Should resource damage occur, 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 amount of 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.

The vegetation communities likely 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 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 produce little or no forage value. Implementation of healthy rangeland standards and guidelines for livestock grazing would ensure the viability of vegetation resources.

Water developments could negatively affect vegetation. Areas around existing water sources receive more use than the adjacent uplands, with increased bare ground, weed invasion, and soil erosion. This would continue in the long term as new waters are developed, however effects to certain areas of sensitive habitat would be reduced because water developments would only be considered if the resource conditions are 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 on localized areas where fences are used to implement grazing management plans or 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 encourage the invasion and growth of noxious weeds. Early spring grazing would also have adverse impact 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 healthy rangeland standards and guidelines.

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 weeds. Loss of vegetation could be short-term or long-term depending on the success of reclamation efforts for disturbed areas. However, if reclamation would be successful, some original plant communities, particularly shrub

communities and stabilized sand dunes, likely would not be reestablished to the same structure and density of predisturbance conditions 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 controlling surface use or no surface occupancy requirements, preserving the character of vegetation communities.

The amount of surface disturbance associated with 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. This impact could be significant if the amount of vegetation lost is of a type that is not abundant within the planning area, 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 and location of development activities (Appendix 17).

Constructing wells or access roads in stabilized dunes would cause direct loss of anchoring vegetation, creating active dunes that may 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. 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 portion of the planning area would be withdrawn from locatable mineral exploration and development (Map 53), and mineral material sales (Map 58). Approximately half the known unique plant communities of basin big sagebrush/lemon scurfpea would be protected from locatable mineral activity through the withdrawal 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 would also be closed to mineral material sales through the closure of the Greater Sand Dunes ACEC, 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. The areas subject to mineral activity could result in direct removal of shrubs and trees, causing adverse long-term effects to 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 cause adverse long-term effects because of direct removal of these communities and long-term reclamation periods. However it would be unlikely that any 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 to native vegetation that, 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, as they have the highest use of traffic to and from the planning area.

There would be no anticipated effects to the threatened Ute Ladies'-Tresses or endangered blowout penstemon. Surveys would be required for threatened and endangered species prior to surface disturbance activities, as well as subsequent protection measures developed by BLM in conjunction with USFWS should a species be found.

Potential habitats of Wyoming BLM sensitive species would require searches for the species prior to approval of any project or activity. Known locations of these communities would be protected and closed or withdrawn from OHV use, locatable mineral development, mineral material sales, and coal and sodium exploration. Special status 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 no surface occupancy designation. The other portion of the habitat falls under existing leases, however these leases will be held in suspension until the indicators monitored in the adaptive management strategy determine that activities can take place within special status plant species habitat. All the above requirements would reduce adverse impacts to special status plant species communities, however the existing fluid mineral leases do not contain lease stipulations protecting these species, therefore it is likely that overall adverse effects could occur if it is determined that development could continue in this area.

Cumulative Impacts. Cumulative effects to vegetation would result from mineral development, livestock grazing, and other surface disturbing activities but would depend on the amount and timing of activities and whether the amount of activity in the planning area outpaces the success of reclamation efforts in disturbed areas. Impacts are not likely to be significant because of the varied spacing of activities, however the impacts are likely to be long-term, even with successful reclamation, because some native shrub plant communities require 20 to 30 years to reestablish to predisturbance conditions. Restrictions on surface use, implementation of healthy rangeland standards and desired plant community objectives, and monitoring efforts would provide protection to vegetation resources and help reduce cumulative impacts. Additional protection would be given to special status plants under the ESA and BLM Sensitive Species guidance, which would further reduce potential cumulative impacts.

Cumulative impacts would be less extensive than under the No Action Alternative because of staged development activity and increased restrictions on surface disturbance.

4.4.6 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 status species, and state species of concern. The impacts that implementing wildlife management actions have on other resources and resource users are discussed in those particular resource sections. This section describes potential impact on wildlife due to 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 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 is sufficiently large or resilient to respond to

disturbance without a measurable change. The significance of an impact is also dependent 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 impact. Impacts to 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 show 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 to wildlife. Long-term displacement of elk or deer from crucial habitat or birthing areas within the planning area would be considered significant.

For analysis purposes it was assumed that the WGFD herd management objective for the Steamboat elk herd unit would be increased to 1,200 elk. It is also assumed that elk populations would continue to exceed WGFD herd management objectives over the short term but would ultimately achieve such objectives over the long term because of herd maintenance efforts (i.e., populations would be declining over the planning period). Therefore the analysis of environmental impacts associated with wildlife resources is based on the WGFD herd management objective rather than the current population level.

A lack of information exists for a wide range of wildlife species, including threatened and endangered species, within the planning area. As activities within the area develop, additional information would be obtained through project-specific data gathering and monitoring. 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 some species. Actions implemented to improve watershed quality are assumed to be directly related to improving wildlife habitat in riparian areas.

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 new oil and gas leases would have stipulations for protection of threatened and endangered and Wyoming BLM sensitive species.

4.4.6.1 Common to All Alternatives

Two types of adverse impacts to 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, and any recreation facilities represents a direct loss of wildlife habitat, and 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 the same structure and density of predisturbance conditions, and portions, particularly in shrub communities and stabilized sand dunes, could remain unavailable as habitat for wildlife in

excess of 20 years. The basin big sagebrush/lemon scurfpea community habitat would likely take up to 70 years to reach the same 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 this type of terrain tend to displace wildlife, particularly big game species, distances upward of 3 miles because of extended sight distances and lack of security cover in the desert-type terrain. The loss of adjacent habitats due to harassment or habitat degradation is much more subtle but has been observed and documented; however it is unknown whether these are long-term effects.

Elk have been shown to avoid disturbance upward of 1 mile from active oil and gas wells (Gussey 1986; Powell and Lindzey 2002; WGFD 2000), upward of 2.4 miles from construction of drill sites (Hayden-Wing Associates 1990), and upward of 2 miles from major roads (Powell and Lindzey 2002). Disturbance is also avoided or reduced by placing topographic visual barriers between the source of disturbance and the elk (Irwin and Gillin 1984; Ward 1986; Olson 1981; Kuck et al. 1985). This disturbance is usually temporary in nature, however, and some studies have shown that elk return to the area of disturbance once the source of disturbance and human presence is absent (Gussey 1986; WGFD 2000). In 1990 Hayden-Wing Associates found that elk returned at half the previous level. Studies particular to oil and gas activities have shown that elk tolerate 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).

A study by Kuck et. al. in 1985 showed that persistent disturbance weakens the tendency of elk to return to the disturbed area and that selection of more marginal habitat occurs. 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 however. The study also found that there was 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 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 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), 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. Preliminary findings of this study include the following: Elk selected habitats offering security cover during calving and summer seasons, including tall sage, aspen, and mountain shrub habitat types; mountain mahogany habitats were selected during winter, and no selection was made of outcrop/badlands or dunes; elk avoided areas within 1.2 miles of active oil and gas wells and areas within 1 mile of major roads and used areas greater than 2.5 miles from active oil and gas wells and 1.9 miles from major roads; 42 percent of all elk observed within roadless areas

(WSAs) occurred during the 2-month fall hunting season; mean daily movements of treatment elk were significantly greater than those of control elk prior to and after disturbance; significantly fewer pellet groups were counted in disturbed calving areas than in those not disturbed (Powell and Lindzey 2002).

It is generally agreed that there is no way to eliminate human presence and disturbance from the area, however once disturbance reaches a certain threshold, impacts are expected to become significant. Further study and monitoring are needed to determine what the threshold is 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 from within species or populations; and an increase in abundance of habitat generalists that are characteristic of disturbed environments (i.e., competitors, predators, and parasites) (Harris 1998). The primary factor affecting wildlife species (primarily big game) within the planning area is the reduction in usable range and disruption of migration corridors that link crucial habitat (winter range) and birthing areas. This would particularly occur in areas with many access roads and surface disturbances.

Transportation routes tend to dissect habitats and can act as barriers to some species, especially in severe winter conditions. This could also increase the accessibility to the general public into areas that previously have been somewhat inaccessible to vehicles during the winter and spring. This would become more important and increase adverse effects to wildlife as increased demands for use of public lands occur. 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. This could diminish the ability to maintain current population objectives for big game species.

Existing leases within the planning area may not provide the specific mitigation measures needed to protect important habitats or wildlife. Mitigating measures (conditions of approval) could be identified through environmental analysis, but depending on economics, the companies could claim an economic hardship and may not have to implement the recommended mitigation measures. Without specific mitigation, such as remote monitoring, pad drilling, directional drilling, and centralized tank batteries, the areas where activity occurs could prevent wildlife from using the area for the life of the activity. Mitigation, such as seasonal closures to protect big game birthing areas within the core and ACECs, would not apply to mineral development that needs to access the area. This has the potential to have significant effects to big game, with the severity of the effects dependent on the amount, timing, and duration of activity, however it is uncertain how big game will react to this disturbance in the planning area.

Given the specificity of Greater Sage-Grouse nesting requirements, including mature sagebrush, it would require in excess of 20 years to restore destroyed nesting habitat to predisturbance conditions. During this time, however, opportunities may exist to enhance remaining vegetation and habitat characteristics (for example, 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 to Greater Sage-Grouse nesting habitat during the planning period. Noise may adversely affect strutting and nesting grouse. The amount of impact is unknown at this time,

but scientific literature suggests that the impacts could be substantial (LaGory et al. 2001; Dantzker et al. 1999).

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 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 the soils or changes in vegetative cover 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. 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, stream bank 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 also impact fisheries by increasing primary production above natural levels, which degrades habitat and decreases oxygen levels. Since 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.

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

The management of heritage sites would indirectly benefit wildlife through preservation of possible habitat as well as general habitat characteristics, but any impact generally would be limited to relatively small areas. Even under the most intense management (i.e., excavation), the amount of habitat disturbed would be very small.

Watershed management would provide benefits to wildlife by maintaining or restoring habitat conditions through the establishment of DPC objectives, buffer zones placed 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 actions afforded to special management areas would generally result in beneficial impacts on wildlife resources. Protections aimed at conserving vegetation resources, and limitations on mineral development and other 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. An adverse effect of prescribed fire on wildlife habitat includes extensive forage utilization by big game species after treatment of aspen stands. 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 attribute to a direct loss of cover for those 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 since sagebrush takes over 20 years to reach 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 could occur to Greater Sage-Grouse nesting habitat and winter concentration areas if large acreages are burned. Brood-rearing habitat also may 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 to wildlife dependent on this association would not occur.

Wild horses currently occur in the planning area outside the identified HMAs and are above AMLs. Both these factors compound 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 to big game would be expected. Water developments provided on an as-needed basis would reduce this competition and therefore lessen adverse impacts to big game. All water developments within sensitive wildlife habitats would be in conformance with wildlife objectives. Adverse impacts in the planning area from wild horses would also be minimal provided numbers are kept at plan objective levels and the herd is maintained within the HMA.

Protection of special status plant species would benefit wildlife habitat through protection of plant species associated with the proposed mountain plover, as well as other wildlife 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.

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 amounts 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 activity is also expected throughout the planning area. No significant OHV impacts to wildlife (specifically elk, mule deer, antelope, 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 the OHVs do cause localized adverse impacts to wildlife by 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. The exception to protection under seasonal restrictions is the Greater Sage-Grouse. Currently no seasonal protection of Greater Sage-Grouse from OHV use exists; therefore possible adverse effects could occur because of the sensitivity and character of leks (usually in areas of very sparse to no vegetation), which provide easier terrain for OHV users. These adverse impacts to Greater Sage-Grouse and other wildlife species could be minimized if users stay on existing roads and trails.

Geophysical exploration activities could have similar effects. However, effects would be reduced by 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 to wildlife from recreation activities would cause localized adverse impacts to wildlife by disturbance due to 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 elk, and most likely all wildlife, in the planning area because of an increase in human activities and disturbance (Powell and Lindzey 2002). Hunting is expected to remain constant, and therefore the level of short-term disturbance from increased human activity would remain the same.

The effects of livestock grazing on wildlife would be minimal because actions (livestock water developments, exclosures, fencing, and conversions) taken 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 could benefit wildlife by providing additional sources of water but could also adversely impact wildlife habitat, particularly in winter and birthing ranges, through possible reductions in forage due to increased distribution of animals. However, implementation of the Wyoming Standards for Healthy Rangelands would ensure that impacts would not be significant. Adverse impacts of fences on wildlife within the planning area would be minimal because of requirements that they would be located so as not to impede wildlife movement and would be removed, modified, or reconstructed where documented conflicts with wildlife occur. Future livestock conversions (sheep to cattle or vice versa) would be carefully analyzed. Sustainability reviews would be required prior to conversions, which would benefit range.

Watershed management would provide benefits to wildlife by maintaining or restoring habitat conditions through the establishment of DPC objectives, buffer zones placed 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.

It is estimated that 23 livestock pits, ponds, and water wells may be created or rebuilt in the planning area. Each one of these water developments is 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 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 are installed (see the Biological Assessment [Appendix 3] for additional assumptions related to depletions from livestock water developments).

Wildlife may 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 which limits some 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 no surface occupancy category that 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 for one-half- to 1-mile from the nesting site, depending on the species of raptor, within Greater Sage-Grouse winter concentration areas, and within 2 miles of Greater Sage-Grouse leks. These restrictions would reduce the adverse impacts to these species, however it is unknown to what extent adverse impact would be reduced.

ROWs (such as pipelines and power lines) could adversely effect wildlife habitat because of the disturbance of 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 may not need to travel pipeline routes, removal or crushing of vegetation allows for 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. Aboveground pipelines would have less adverse impact to crucial wildlife habitats (big sagebrush, mountain shrubs, woodland habitats, stabilized sand dunes), however these pose a threat to public safety, primarily OHV users. ROW impacts to Greater Sage-Grouse leks and other sensitive wildlife habitat contained in South Pass, Greater Sand Dunes, and Steamboat Mountain ACECs would be reduced because of their designation as avoidance areas (Map 8). All other wildlife habitats are 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 crucial habitat (winter range) and birthing 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 birthing areas. Plowing of these roads also allows for more recreational traffic to use these areas year-round. Steamboat Mountain ACEC would be closed to communication sites, which would minimize adverse impacts to big game 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 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), 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 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 No surface occupancy-designated areas.

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, then steadily decreasing through the rest of the planning period to 8 wells per year as producing wells play 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 mostly occur on existing leases for the first few years of development. The phase of fluid mineral activity most disturbing to wildlife is drilling because of large amounts 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 the depth of the well. All wells not put into production would be reclaimed through implementation of a reclamation plan. Production wells that play out after an estimated 30 years would also be reclaimed. Full restoration of some habitats would not occur for more than 20 years (Section 4.4.6.1, Common to All Alternatives).

The Steamboat elk herd, and likely most wildlife species, would experience adverse effects from fluid mineral development, causing it to avoid areas of disturbance due to drilling, the creation of roads, and possible disruption of migratory corridors. The level of adverse effects, however, would depend on where the activity occurs within the planning area. Existing leases within the planning area are spread throughout the majority of the area. Should development of 19 wells per year for the first 4 years of development be dispersed throughout the planning area, adverse effects to the elk herd could be minimal because of the possible availability of alternative habitats. Should development be concentrated within the high development potential area, which includes the core area, adverse effects to the elk herd would be greater than if development were dispersed, because the majority of the high development potential area overlaps big game crucial habitat and birthing areas. Concentrated development in this area would reduce available habitat and likely disrupt migratory corridors. As development reduces throughout the planning period after the first 4 years, adverse effects to the elk herd would be slowly reduced, and gradual replacement of habitat from restoration activities would occur.

It is estimated that two coalbed methane 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 to wildlife, particularly big game, are expected to be similar to those for oil and gas wells. Because coalbed methane wells are drilled in a “pod” formation for dewatering purposes, with approximately 25 wells per pod, impacts are expected to be more intense and localized but may not affect as much acreage as traditional oil and gas well development.

Drilling and completion activities for oil, gas, and coalbed methane 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. Additionally, 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 the coalbed methane 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 is described in the Biological Assessment (Appendix 3) for this document.

Locatable mineral activity on existing active claims in and around northern birthing areas has the potential to decrease the availability of these areas for calving and fawning. This particularly applies to the activities that might occur in or near aspen stands associated with deer and elk birthing 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. Should exploration activities find the potential for this development, a plan of operation must be filed that specifies how mining will be conducted without permanently impacting other resources. Reclamation plans must also be developed, and bonds must be posted to ensure mined lands are reclaimed.

The planning area would be open for consideration of mineral material sales except in raptor nesting sites, South Pass Summit, WSAs, Greater Sand Dunes ACEC, and 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 birthing areas for big game are outside these areas. These provisions also do not protect Greater Sage-Grouse nesting habitat. This is likely to cause localized adverse impacts to 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, Common to All Alternatives).

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, one-quarter-mile of Greater Sage-Grouse leks, raptor nesting sites, and Steamboat Mountain ACEC (Map 11). Effects of this exploration on wildlife habitat are expected to be minimal because of the small amounts of surface disturbance associated with exploration and 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). This would reduce adverse effects to wildlife habitat from coal leasing overall. In addition, wetlands, riparian areas, and floodplains, as well as a portion of the Greater Sand Dunes ACEC, would be closed to leasing within this area. Raptor nesting sites with one-half- to 1-mile buffer, and Steamboat

Mountain ACEC (big game birthing and crucial habitat), would be open to coal leasing with subsurface mining and controls on surface facilities, further minimizing adverse impacts to 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 to develop this resource in this area is minimal.

The majority of federally listed, proposed, and candidate species known to occur within the planning area or potentially occurring within the planning area may be affected by management actions but would not likely be adversely affected. These species include the black-footed ferret, mountain plover, and yellow-billed cuckoo. Species may be affected because of the amount of surface disturbance and human activity associated with management of the planning area, however no adverse effects would occur because of required surveys for these species prior to surface disturbance activities and subsequent protection measures developed by BLM in conjunction with FWS should a species be found. Protection measures are currently in place for the known locations of mountain plover within the planning area. There would be no effect to the bald eagle or whooping crane from management of the planning area, because of their status as a casual migrant.

It is unknown whether adverse impacts would occur to Wyoming BLM sensitive species because of the lack of information on habitat locations and requirements within the planning area. Potential habitats would require searches for the species prior to approval of any project or activity. Should a species be found, mitigation measures would be species-specific and determined on a case-by-case basis.

***Cumulative Impacts*.** Cumulative effects to wildlife habitat would result from surface disturbing and disruptive activities in the form of habitat fragmentation and animal displacement (short- or long-term), depending on the amount, location, and timing of activities. Impacts could be long-term, because some habitats would not reestablish to predisturbance conditions for more than 20 years. 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 may 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, birthing, nesting, and early rearing of young. Impacts to fisheries may include increased peak flows, increased sediment loads, decreased vigor in riparian plants, structural changes in riparian plant communities, and unstable stream banks. Impacts to wildlife could be significant if activities are concentrated in areas of sensitive wildlife habitat, and/or increased development and surface disturbance alter existing big game migration corridors to the extent that access to important habitat areas (birthing and winter ranges) is greatly reduced.

4.4.6.3 Alternative 1

Effects of prescribed fire (vegetation treatment) would be the same as under the No Action Alternative, except use would be decided on a case-by-case basis which may 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 of the No Action Alternative. Reduced protection of special status plant species, primarily BLM sensitive species, from exclusion areas to avoidance areas would possibly reduce the benefit of protection of wildlife habitat described under the No Action Alternative. Effects of the reduction of invasive species on wildlife habitat would be the same as under 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 that under the No Action Alternative, adverse effects to wildlife habitat are expected to be greater because of a lack of seasonal restrictions on the majority of habitats (big game). Although raptors still have seasonal restrictions associated with nesting sites, the seasonal buffer around the site would be reduced to one-quarter-mile instead of one-half- to 1-mile as discussed in the No Action Alternative. Greater Sage-Grouse and mountain plover would be afforded increased protection under this alternative compared to the No Action Alternative because of seasonal limitations on Greater Sage-Grouse leks with a 1-mile buffer and mountain plover aggregation areas.

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 to wildlife would be short-term as described in the No Action Alternative.

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 is compromised. This additional impact would only be realized on allotments that are 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 of the No Action Alternative, except fences would only be modified or reconstructed where documented wildlife conflicts with fencing occur; it would not be removed. Existing exclosures could be removed and made available for livestock grazing. New exclosures would not be considered unless they benefit commodity uses. This has the potential to adversely effect wildlife through potential loss of habitat from overgrazing particular areas.

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

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

Overall adverse effects of surface disturbing activities on wildlife habitat would be greater than under the No Action Alternative because of a lack of seasonal restrictions on sensitive wildlife habitat other than Greater Sage-Grouse nesting buffers (1 mile), raptor nest sites with one-quarter-mile buffers, and mountain plover aggregation areas (Map 16). Greater Sage-Grouse leks and wetlands, riparian areas, and floodplains are within the controlled surface use category that limits some surface disturbing activities within a one-quarter-mile of the lek and 250 feet of a wetland, riparian area, or floodplain.

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 is the designation of Greater Sage-Grouse leks with one-quarter-mile buffers as a ROW avoidance

area. All other wildlife habitat is open to ROWs. A lack of transportation planning under this alternative would also increase adverse effects to wildlife habitat, particularly big game, because of additional lack of control over access at all times of the year.

Geophysical exploration and detonation, and coal and sodium exploration activities (Map 21) under this alternative, could cause significant adverse effects to wildlife habitat, except in WSAs, because of a lack of seasonal restrictions protecting big game crucial habitat (winter range) and birthing areas. Effects could include displacement from noise associated with disruptive activities, surface disturbance, possible abandonment of habitat during birthing periods, and additional stress placed on big game populations during winter periods.

Effects of communications sites would be the same as those described under the No Action Alternative, however Steamboat Mountain ACEC would be open to consideration of communication sites, increasing adverse effects to wildlife habitat.

The entire planning area, except WSAs, would be open to fluid mineral leasing (Map 20). The Hydrocarbon Occurrence and Development Potential Report 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 and then steadily decreasing to 10 wells per year as producing wells play out. This expected level of development would cause significant impacts to wildlife. Effects under this alternative would be significant because of lack of protection from leasing in the core area and lack of stipulations for new leases which protect big game and other sensitive wildlife through a minimum of seasonal limitations.

Mountain plover and Greater Sage-Grouse may also experience adverse impacts from fluid mineral development in the form of creation of perches for raptors that prey on each species. Mitigation for creation of perches would include measures adding 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 their design.

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

Using the same assumptions as for the No Action Alternative and a total of 264 oil and gas wells, water depletions from oil, gas, and coalbed methane wells 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 two systems 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 leks, mountain plover aggregation areas, and large portions of big game crucial habitat (winter range) and birthing areas would be subject to mineral material sales, and therefore adverse impacts to these habitats are expected, even with implementation of reclamation practices, because of the sensitivity of these habitats.

Effects to wildlife habitat from federal coal lands within the Coal and Sodium Occurrence and Development Potential Area would be greater than those of the No Action Alternative because of a lack of protection for wetlands, riparian areas, and floodplains, and the removal of the ACEC designation from Steamboat Mountain.

Eliminating certain management actions with the removal of the ACEC designation from Steamboat Mountain may cause significant impacts to wildlife habitat, particularly that of big game, because of the lack of other protections, such as seasonal limitations and restrictions on surface disturbance, under this alternative.

Impacts to federally listed, proposed, and candidate species would be the same as those described under the No Action Alternative, however additional protection is provided for mountain plover aggregation areas through seasonal limitation designation.

Impacts to 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 alternative would most likely have the greatest amount of adverse impacts to wildlife.

Cumulative Impacts. Cumulative impacts would be the same as those described in the No Action Alternative, except impacts would be significant because of anticipated increases in development and minimal restrictions on activities within sensitive wildlife habitat, big game migration corridors, and riparian areas.

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 under the No Action Alternative. Impacts on BLM sensitive species would also be the same as under the No Action Alternative.

Effects of prescribed fire (vegetation treatment) under this alternative have less adverse impact to wildlife cover 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 to the basin big sagebrush/lemon scurfpea association would be greater than under the No Action Alternative because of limited fire suppression activities, causing possible increased adverse effects to big game because of this association's role as crucial habitat and birthing areas.

This alternative would reestablish the boundaries of the Divide Basin Wild Horse HMA to exclude the JMH 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 impact 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 account for increased forage and water sources for wildlife because of less competition among wild horses, livestock, and wildlife.

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 amounts 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 is also expected throughout the planning area. Adverse impacts to wildlife habitat would be significantly less than under the No Action alternative because of the combined factors of a reduction in use and, most importantly, closure of sensitive wildlife habitats to OHV use. Seasonal limitations on big game crucial habitat and limiting the remainder of the planning area to designated roads and trails would also contribute to the reduction of adverse impacts to 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 into the planning area. Adverse effects to wildlife would be short-term as described in 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. Effects of livestock grazing on wildlife habitat under this alternative would be similar to those of the No Action Alternative, except that exclosures and water developments would be allowed in sensitive wildlife habitat only if they preserve sensitive resources or improve habitat and resource conditions.

The effects of watershed management actions would be the same as those of 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.

It is estimated that 11 livestock pits, ponds, and water wells may be created or rebuilt in the planning area under this alternative. Of the 11 water developments to be constructed, 9 would be in the Green River (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, average annual depletions anticipated by 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 are installed (see the Biological Assessment [Appendix 3] for additional assumptions related to depletions from livestock water developments).

Overall adverse impacts of surface disturbance on wildlife habitat would be reduced compared to the No Action Alternative because of designations which control, exclude, or seasonally limit surface disturbance on sensitive wildlife habitats (Map 28). Steamboat Mountain crucial overlap, wetlands, riparian areas, and floodplains, and Steamboat Mountain ACEC would be designated areas with controlled surface use under this alternative. Greater Sage-Grouse concentration areas, Greater Sage-Grouse winter concentration areas, elk and mule deer birthing areas, mountain plover aggregation areas with a one-quarter-mile buffer, Greater Sand Dunes ACEC, and raptor nesting sites with a one-half- to 1-mile buffer would be designated no surface occupancy 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 cannot be avoided would occur.

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

Adverse effects from geophysical activities on wildlife habitat would be minimal because of provisions that exclude exploration in areas with no surface occupancy requirements, WSAs, ACECs, and other sensitive resource areas. Seasonal limitations would also apply, further reducing the impact to wildlife habitat.

Adverse effects of communication sites on wildlife habitat 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 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 for willing leaseholders. Approximately 163 oil and gas wells would be drilled over the planning period: 16 wells for the first 4 years and then steadily decreasing to 5 wells per year as producing wells play out. Adverse effects on wildlife habitat from fluid mineral development are expected to be much less than those of the No Action Alternative because of a reduction in the amount of wells assumed for the planning period, closure of sensitive wildlife areas, and the purchase or exchange existing leases. Because of uncertainty surrounding the number of willing leaseholders that would participate in purchase or exchange of their leases, and the amount of funds available to BLM for this activity, it is unknown whether adverse impacts to wildlife habitat would occur and the extent to which these impacts would occur.

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

Using a total of 163 oil and gas wells and 25 coalbed methane wells, water depletions from oil, gas, and coalbed methane wells would total approximately 270 acre-feet in the Colorado River system and 12 acre-feet in the Platte River system. Based on a 20-year time span, the average annual depletion for the two 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 is 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 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 Indian Gap, the face of Steamboat Mountain, and the area where elk crucial habitat and birthing areas overlap to 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 and the

cushion plant community as ACECs, and designation of the New Pinnacles WSA, would also benefit wildlife habitat as described above.

Impacts to federally listed, proposed, and candidate species would be the same as those described under the No Action Alternative; however additional protection would be provided for mountain plover aggregation areas with one-quarter-mile buffers by designating them areas of no surface occupancy requirements. This alternative would most likely have the least amount of adverse impacts to wildlife.

Cumulative Impacts. Cumulative impacts would be the same as those described in the No Action Alternative, except impacts would be least extensive under this alternative because of anticipated decreases in development and increased restrictions on activities within sensitive wildlife habitat, big game migration corridors, and riparian areas.

4.4.6.5 Alternative 3

Impacts resulting from the management of special status plant species on wildlife habitat would be the same as under the No Action Alternative. Impacts on BLM sensitive species would be the same as under the No Action Alternative.

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

As a result of expanding 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 are slightly less because only 100 horses of the 415–600 AML would be allowed in the expanded area.

OHV use is expected to remain constant because of no improvements in the facilities near the Greater Sand Dunes Recreation Area and access limitations. Estimated amounts 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 activity is also expected throughout the planning area. Adverse impacts to wildlife habitat would be less than under the No Action Alternative because of the combined factors 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 raptor nesting sites would be closed and mountain plover aggregation areas with one-quarter-mile buffer would be added.

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

Other recreation activities besides OHV use (camping, hiking/biking, recreational mining) in the planning area 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 five-acre site, reducing the impacts from these activities compared to 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. Effects of livestock grazing on wildlife habitat under this alternative would be the same as under the No Action Alternative, except that water developments would be allowed in sensitive wildlife habitat only if they maintain or improve habitat and resource conditions.

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

The effects of watershed management actions would be the same as 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.

Adverse effects of surface disturbance on wildlife habitat would be reduced compared to the No Action Alternative because of designations that control, exclude, or seasonally limit 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 no surface occupancy under this alternative. Permanent or high-profile structures would also be limited within a specified distance. Big game crucial habitat (winter range) and birthing areas, mountain plover aggregation areas with one-quarter-mile buffer, Greater Sage-Grouse winter concentration areas, and raptor nest sites with one-half- to 1-mile buffers would be seasonally limited.

Adverse effects of ROWs on wildlife habitat under this alternative would be slightly less than under the No Action Alternative because of changes of 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 to wildlife habitat from ROWs, roads, OHV use, and general access. This plan would provide for appropriate access routes that enable maximum protection of crucial habitats and sensitive resources.

Adverse effects from geophysical activities on wildlife habitat would be minimal because of provisions that exclude exploration from areas with no surface occupancy requirements, WSAs, ACECs, and other sensitive resource areas. Seasonal limitations would also apply, further reducing the adverse impact to wildlife habitat.

Adverse effects of communication sites on wildlife habitat would be slightly less than under the No Action Alternative because of the additional exclusion areas (Oregon Buttes and Continental Peak) added to 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 for the first 4 years and then steadily decreasing to 7 wells per year as producing wells play out. Adverse effects such as described in 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 adverse effects of actions within the planning area and prevent them from becoming significant through BLM's ability to control timing of

development activities. Adverse effects of existing leases as described above in the Common to All Alternatives section would still occur, however once leases expire they would become part of the adaptive management process.

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

Using the same assumptions as the No Action Alternative and a total of 205 oil and gas wells, water depletions from oil, gas, and coalbed methane wells 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 two 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 is described in the Biological Assessment (Appendix 3) for this document.

There would be limited adverse effects to the northern birthing areas from existing mining claim activity, however effects would be reduced because of the withdrawal of this habitat under this alternative (Map 45). In addition, portions of Steamboat Mountain as well as additional area added to the Greater Sand Dunes ACEC would also be withdrawn, reducing adverse effects of mining on wildlife habitat. All other effects of locatable mineral development on wildlife habitat are the same as those 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 to big game. Overall impacts of mineral material sales on wildlife habitat could be slightly greater than those of the No Action Alternative.

The effects of coal and sodium exploration on wildlife habitat from this alternative would be less than that of 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 of additional areas protected.

Management actions associated with the addition of the paleosol deposition area to Greater Sand Dunes ACEC and Indian Gap, and the face of Steamboat Mountain to 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 and the cushion plant community as ACECs would also benefit wildlife habitat as described above.

Impacts to federally listed, proposed, and candidate species would be the same as those described under the No Action Alternative, however additional protection is provided for mountain plover aggregation areas with one-quarter-mile buffers by designating them as areas with seasonal limitations.

Cumulative Impacts. Cumulative impacts would be the same as those described in the No Action Alternative, except impacts would be less extensive because of anticipated decreases in development, implementation of adaptive management strategies, and increased

restrictions on activities within sensitive wildlife habitat, big game migration corridors, and riparian areas.

4.4.6.6 Preferred Alternative

Two types of adverse impacts to wildlife are common to all alternatives: displacement and habitat fragmentation. However, these two adverse impact types vary in degree. 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, and any recreation facilities represents a direct loss of wildlife habitat, and 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 the same structure and density of predisturbance conditions, and portions, particularly in shrub communities and stabilized sand dunes, could remain unavailable as habitat for wildlife in excess of 20 years. The basin big sagebrush/lemon scurfpea community habitat would likely take up to 70 years to reach the same 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 this type of terrain tend to displace wildlife, particularly big game species, distances upward of 3 miles because of extended sight distances and lack of security cover in the desert-type terrain. The loss of adjacent habitats due to harassment or habitat degradation is much more subtle but has been observed and documented, however it is unknown whether these are long-term effects.

Elk have been shown to avoid disturbance upward of 1 mile from active oil and gas wells (Gussey 1986; Powell and Lindzey 2002; WGFD 2000), upward of 2.4 miles from construction of drill sites (Hayden-Wing Associates 1990), and upward of 2 miles from major roads (Powell and Lindzey 2002). Disturbance is also avoided or reduced by placing topographic visual barriers between the source of disturbance and the elk (Irwin and Gillin 1984; Ward 1986; Olson 1981; Kuck et al. 1985). This disturbance is usually temporary in nature, however, and some studies have shown that elk return to the area of disturbance once the source of disturbance and human presence is absent (Gussey 1986; WGFD 2000). In 1990, Hayden-Wing Associates found that elk returned at half the previous level. Studies particular to oil and gas activities have shown that elk tolerate 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).

A study by Kuck et. al. in 1985 showed that persistent disturbance weakens the tendency of elk to return to the disturbed area, and that selection of more marginal habitat occurs. 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, however. This study also

found that there was 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. They 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), 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. Preliminary findings of this study (to be completed Fall 2002) include the following: Elk selected habitats offering security cover during calving and summer seasons, including tall sage, aspen, and mountain shrub habitat types; mountain mahogany habitats were selected during winter, and no selection was made of outcrop/badlands or dunes; elk avoided areas within 1.2 miles of active oil and gas wells and areas within 1 mile of major roads, and used areas greater than 2.5 miles from active oil and gas wells and 1.9 miles from major roads; 42 percent of all elk locations within roadless areas occurred during the 2-month fall hunting season; mean daily movements of treatment elk were significantly greater than those of control elk prior to and after disturbance; significantly fewer pellet groups were counted in disturbed calving areas than in not disturbed (Powell and Lindzey 2002).

It is generally agreed that there is no way to eliminate human presence and disturbance from the area, however once disturbance reaches a certain threshold, impacts are expected to become significant. Further study and monitoring are needed to determine what the threshold is 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 from within species or populations; and an increase in abundance of habitat generalists that are characteristic of disturbed environments (i.e., competitors, predators, and parasites) (Harris 1998). The primary factor affecting wildlife species (primarily big game) within the planning area is the reduction in usable range and disruption of migration corridors that link crucial habitat (winter range) and birthing areas. This would particularly occur in areas with many access roads and surface disturbances. Transportation routes tend to dissect habitats and can act as barriers to some species, especially in severe winter conditions. This could also increase the accessibility of the general public into areas that have previously been somewhat inaccessible to vehicles during the winter and spring. This would become more important and increase adverse effects to wildlife as increased demands for use of public lands occur. 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. This could diminish the ability to maintain current population objectives for big game species.

Given the specificity of Greater Sage-Grouse nesting requirements, including mature sagebrush, it would require more than 20 years to restore destroyed nesting 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 to Greater Sage-Grouse nesting habitat during the planning period. Noise may adversely affect strutting and nesting grouse. The amount of impact is unknown at this time, but scientific literature suggests that the impacts could be substantial (LaGory et al. 2001; Dantzker et al. 1999).

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

Protections afforded to special management areas would generally result in beneficial impacts on wildlife resources. Protections aimed at conserving vegetation resources, and limitations on mineral development and other surface disturbing activities, would benefit wildlife by enhancing overall habitat conditions. The addition of the West Sand Dunes Archeological District would reduce adverse effects to big game habitats through management prescriptions that limit surface disturbing and disruptive activities within special management areas.

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. An adverse effect of prescribed fire on wildlife habitat includes extensive forage utilization by big game species after treatment of aspen stands. To reduce adverse effects to 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 attribute to a direct loss of cover for those 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 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 could occur to Greater Sage-Grouse nesting habitat and winter concentration areas if large acreages are burned. Brood-rearing habitat may 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 to wildlife dependent on this association would not occur.

Wild horses currently occur in the planning area outside the identified HMAs and are above AMLs. Both these factors compound 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 to big game would be expected. Water developments provided on an as-needed basis would reduce this competition and therefore

lessen adverse impacts to big game. All water developments within sensitive wildlife habitats would be considered only if wildlife habitat and resource conditions are improved or maintained. Adverse impacts in the planning area from wild horses would also be minimal provided numbers are kept at plan objective levels and the herd is maintained within the HMA.

Protection of special status plant species would benefit wildlife habitat through protection of plant species, associated with the proposed mountain plover and other wildlife 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.

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 amounts 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 activity is also expected throughout the planning area. No significant OHV impacts to wildlife (specifically elk, mule deer, antelope, and raptors) are expected from OHV use because of the ability to place of 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 would occur in the summer and fall (June through October), a time when wildlife would be the least sensitive to human disturbance. However, the OHVs do cause localized adverse impacts to wildlife by 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. The exception to protection under seasonal restrictions is the Greater Sage-Grouse. No seasonal protection of the Greater Sage-Grouse from OHV use exists; therefore possible adverse effects could occur because of the sensitivity and character of leks (usually in areas of very sparse to no vegetation), which provides easier terrain for OHV users. These adverse impacts to the Greater Sage-Grouse and other wildlife species could be minimized if users stay on existing roads and trails.

ROWs (such as pipelines and power lines) could adversely effect wildlife habitat because of the disturbance of 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 may not need to travel pipeline routes, removal or crushing of vegetation allows for 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. Aboveground pipelines would have less adverse impact to crucial wildlife habitats (big sagebrush, mountain shrubs, woodland habitats, stabilized sand dunes), however these pose a threat to public safety, primarily OHV users. ROW impacts to Greater Sage-Grouse leks and other sensitive wildlife habitat contained in the South Pass Historic Landscape ACEC, West Sand Dunes Archaeological District, and connectivity area would be reduced because of their 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 to wildlife.

Communication sites and related access, when located in crucial habitat (winter range) and birthing 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 birthing areas. Plowing of these roads also allows for more recreational traffic to use these areas year-round. Steamboat Mountain ACEC would be closed to communication sites, which would minimize adverse impacts to big game sensitive habitats in the majority of the core area.

Effects of geophysical exploration and related detonation activities on wildlife would be minimal given limitations of exploration within key wildlife habitats such as the connectivity area, basin big sagebrush/lemon scurfpea, and a one-quarter mile buffer of Greater Sage-Grouse leks. Exploration and related detonation activities also would be allowed only in sensitive resource areas, 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 to 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 birthing 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. Impacts to wildlife from recreation activities would cause localized adverse impacts to wildlife by disturbance due to 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 elk, and most likely all wildlife, in the planning area because of an increase in human activities and disturbance (Powell and Lindzey 2002). Hunting is expected to remain constant, and therefore the level of short-term disturbance from increased human activity would remain the same.

The effects of livestock grazing on wildlife would be minimal because actions (livestock water developments, exclosures, fencing, and conversions) taken 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 impact wildlife habitat, particularly in winter and birthing ranges, through possible reductions in forage due to increased distribution of animals. However, implementation of the Wyoming Standards for Healthy Rangelands would ensure that impacts would not be 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 migration, and would be removed, modified, or reconstructed where documented conflicts with wildlife occur. Future livestock conversions (sheep to cattle or vice versa) would be carefully analyzed. Sustainability reviews would be required prior to conversions, which would benefit range.

Watershed management would provide benefits to wildlife by maintaining or restoring habitat conditions through the establishment of DPC objectives, buffer zones placed 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.

It is estimated that 23 livestock pits, ponds, and water wells may be created or rebuilt in the planning area. Each of these water developments is 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 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 5 acre-feet for the Colorado River system and 1 acre-foot for the Platte River system after all are installed (see the Biological Assessment [Appendix 3] for additional assumptions related to depletions from livestock water developments).

The phase of fluid mineral activity most disturbing to wildlife is drilling, because of large amounts 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 play out after an estimated 30 years would also be reclaimed. Full restoration of some habitats would not occur for more than 20 years (Section 4.4.6.1, Common to All Alternatives).

The Steamboat elk herd, and likely most wildlife species, would experience adverse effects from fluid mineral development, causing avoidance of areas because of drilling, creation of roads, and possible disruption of migratory corridors. The level of adverse effects however would depend on where the activity within the planning area occurs. Existing leases within the planning area are spread throughout the majority of the area. Should development of wells be dispersed throughout the planning area, adverse effects to the elk herd could be minimal because of the possible availability of alternative habitats. Should development be concentrated within the high development potential area, which includes the core area, adverse effects to the elk herd would be greater than if development were dispersed because the majority of the high development potential area overlaps big game crucial habitat and birthing areas. Big game would also tend to seek alternative habitats and migratory routes. Because of uncertainties as to where and at what level development will proceed within the planning area, as well as uncertainties associated with the reaction of wildlife to development activities, an adaptive management strategy (Appendix 17) would be implemented under this alternative, which would allow for continued suspension of some existing leases in sensitive areas; surface disturbance restrictions on new leases in sensitive areas; and establishment of indicators to inform BLM of adverse effects of actions within the planning area and to prevent them from becoming significant through BLM's ability to control timing and location of development activities.

In addition to areas designated with surface disturbance restrictions under the adaptive management strategy (Appendix 17, Map A17-1), seasonal limitations would also apply to all Greater Sage-Grouse habitat (including winter concentration areas) as well as raptor, mountain plover, and big game birthing and crucial habitats. These restrictions would reduce adverse impacts to these species during important times of their lifecycle.

It is estimated that two coalbed methane 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 to wildlife, particularly big game, are expected to be similar to those associated with oil and gas wells. Because coalbed methane wells are drilled in a "pod" formation for dewatering purposes, with approximately 25 wells per pod, impacts are expected to be more intense and localized but may not affect as much acreage as traditional oil and gas well development.

Drilling and completion activities for oil, gas, and coalbed methane 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. In addition, 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 the coalbed methane 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 two 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 is described in the Biological Assessment (Appendix 3) for this document.

Locatable mineral activity on existing active claims in and around northern birthing areas has the potential to decrease the availability of these areas for calving and fawning. This particularly applies to the activities that might occur in or near aspen stands associated with deer and elk birthing 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 birthing 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. Should exploration activities find the potential for this development, a plan of operation must be filed that specifies how mining will be conducted without permanently impacting other resources. Reclamation plans must also be developed, and bonds must be posted, to ensure mined lands are reclaimed.

Habitat within the planning area would be open for consideration of mineral material sales except one-half mile to 1 mile from raptor nesting sites, Steamboat Mountain ACEC, and one-half mile from Greater Sage-Grouse leks (Map 58). Closing these areas to mineral material sales would benefit a portion of wildlife habitat, however a large portion of crucial

habitat (winter range) and birthing areas for big game are outside these areas. This is likely to cause localized adverse impacts to 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, Common to All Alternatives).

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, and one-quarter mile of sage grouse leks, raptor nesting sites, and Steamboat Mountain ACEC (Map 55). Effects of this exploration on wildlife habitat are expected to be minimal because of the small amounts of surface disturbance associated with exploration and 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 to wildlife habitat from coal leasing overall. In addition, wetlands, riparian areas, and floodplains, and 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 Steamboat Mountain ACEC (big game birthing and crucial habitat), would also be open to coal leasing with subsurface mining and controls on surface facilities, further minimizing adverse impacts to 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 to develop this resource in this area is minimal.

The majority of federally listed, proposed, and candidate species known to occur within the planning area or potentially occurring within the planning area may be affected by management actions but would not likely be adversely affected. These species include the black-footed ferret, mountain plover, and yellow-billed cuckoo. Species may be affected because of the amount of surface disturbance and human activity associated with management of the planning area, however no adverse effects would occur because of required surveys for threatened and endangered species prior to surface disturbance activities and subsequent protection measures developed by BLM in conjunction with FWS should a species be found. There would be no effect to the bald eagle and whooping crane from management of the planning area, because of their status as a casual migrant.

It is unknown whether adverse impacts would occur to Wyoming BLM sensitive species, because of the lack of information on habitat locations and requirements within the planning area. Potential habitats would require searches for the species prior to approval of any project or activity. Should a species be found, mitigation measures would be species-specific and determined on a case-by-case basis.

Cumulative Impacts. Cumulative effects to wildlife habitat would result from surface disturbing and disruptive activities in the form of habitat fragmentation and animal displacement (short- or long-term) depending on the amount, location, and timing of activities. Impacts could be long-term, because some habitats would not reestablish to predisturbance conditions for more than 20 years. 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 may 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, birthing, nesting, and early rearing of young. Impacts to fisheries may include increased peak flows, increased sediment

loads, decreased vigor in riparian plants, structural changes in riparian plant communities, and unstable stream banks. Impacts to wildlife could be significant if activities are concentrated in areas of sensitive wildlife habitat, and/or increased development and surface disturbance alters existing big game migration corridors to the extent that access to important habitat areas (birthing and winter ranges) is greatly reduced.

Cumulative impacts would be less extensive than under the No Action Alternative because of staged development activity and increased restrictions on activities within sensitive wildlife habitat, big game migration corridors, and riparian areas.

4.5 HERITAGE RESOURCES

Heritage resources are limited, nonrenewable resources whose values may be easily diminished by physical disturbances. Resources include cultural and historic trails and sites, archeological 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 to resources and nonenvironmental effects to resource users. Impacts that heritage resource program implementation may have on other resources and other resource users are discussed in those particular resource sections. This section describes potential impacts on heritage resources through the implementation of management actions for other resource management categories.

The criteria used to determine the significance of impact on heritage resources include the effect on NRHP eligibility, future research potential, or 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 the resource.

For analysis purposes, it was assumed the overall densities of archeological sites in the planning area would be approximately 3.2 sites per 640 acres (one section), and that about one-third of the sites prove to be significant in terms of NRHP criteria. This density is based on less than 5 percent of the planning area inventoried at a Class III level intensity. Areas of site densities as high as 15 sites per section have been found.

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 traffic or machinery, or alteration of the setting or landscape. If disturbed, heritage resources could lose potential information, integrity, and cultural value. Federal regulations that address heritage resources require inventory, recordation, and evaluation of resources in the area of potential effect as part of the approval process for any surface disturbing activity. If disturbance or destruction is not avoidable, sites would be managed to ensure against adverse effects through proper mitigation. 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).

The preferred method of managing heritage resources within the context of land development operations would be to avoid effects to heritage resources. BLM would use GIS and other technologies to place surface disturbing activities in areas least intrusive to heritage resource values. When avoidance is not possible, several mitigation measures could be applied to lessen the effects to 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. Data recovery could have an indirect beneficial effect for the public, because it contributes to increased understanding and appreciation of our shared heritage. 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 also because adverse effects to them cannot 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. Consultation with Native American tribal representatives could delay development activities or result in changes to a project design and location, having an adverse impact on the developer.

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.

Paleontological resources are known in the planning area. Prior to 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. If impacts cannot be avoided, the site would be evaluated and surveyed (as needed) by a professional paleontologist. A mitigation plan that 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. Identification and mitigation measures to protect paleontological resources could have an adverse impact on the user, and the effect could be significant if the time and expense involved with data recovery would make the project uneconomical.

Land exchanges and ownership adjustments could have an adverse effect on heritage resources if such resources are located on the affected parcels. Most impacts would occur by the changing or adjustment of property boundaries. New ownership could significantly alter an existing designation because the State of Wyoming does not have extensive state laws

protecting heritage resources, thus land exchanges with the state could be adverse by removing the property from the protection of the National Historic Preservation Act and other federal laws. In addition, 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.

Fire suppression efforts would have beneficial effects by protecting standing historic structures, however the use of heavy equipment and resultant 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. The prescribed burn proposed for the Pacific Creek area would not occur until archaeological remains of any wooden structures in the area are removed or protected.

Actions associated with managing the wild horse program usually would not have any adverse impact on heritage resources. The area would be inventoried and evaluated for heritage resources prior to any disturbance, thus avoiding effects to significant 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. Wild horses, for these reasons, could be considered a heritage resource, and thus their appropriate management would represent a beneficial effect on traditional values.

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 National Historic Landscape (including the Oregon, California, Mormon Pioneer, and Pony Express National Historic Trails), Boars Tusk, Crookston Ranch, and Tri-Territory Marker. Other areas may be included in the future, as further NRHP-eligible sites and/or ACEC designations are considered.

Sites eligible for inclusion in the National Register of Historic Places because of their scientific value would be protected. Preservation of the scientific information would be the preferred mitigation method should any such sites have to be impacted by other activities. These sites include 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 yet beneficial impacts on heritage resources. Implementing healthy rangeland standards, meeting PFC standards, taking measures to achieve DPC objectives, and controlling or preventing surface disturbing activities in sensitive wildlife habitat all would contribute to improved range conditions, soil and vegetation stability, and decreased soil erosion. Overuse of an area by livestock, wildlife, and

wild horses could accelerate erosion and thus destroy the soil matrix that could contain archaeological or historical resources. Proper construction of water developments and range improvements, and proper placement of salt and mineral supplements, would minimize any adverse impact on heritage resources. Areas would be inventoried and evaluated for heritage resources prior to any disturbance for construction of fences, water developments, and any range improvements, thus mitigating any impact. 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.

Managing travel and access throughout the planning area could have beneficial impacts on heritage resources. Limiting OHV use to existing roads and trails 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. Preauthorization inventory and avoidance could usually allow the geophysical operation to be conducted in such as way as to avoid affecting most heritage resources.

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 removes vegetation, excavates and compacts soils, and contributes to increased erosion that could expose buried archaeological sites. As common to all alternatives, 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 to 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.

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 those for saleable 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, face of Steamboat Mountain, and around Native American respected places could have adverse impacts to these resources and would be avoided to the extent possible. The significance of any adverse impact would depend on the significance of the resource (i.e., its eligibility for NRHP inclusion) and implementation of mitigation measures. On rare occasions heritage resources may 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 becomes economically unfeasible.

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.

Withdrawals identified in the Green River Resource Management Plan (RMP) would be pursued. Withdrawing lands from certain resource uses 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 the filing of mineral claims, exploration, and the development of locatable minerals. The 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 prior to the revocation of the oil shale and coal classifications. Preauthorization inventory and evaluation are not always required prior to some mining operations conducted pursuant to the 1872 Mining Act, thus surface disturbance associated with mining claims could have the potential to destroy archaeological and historical resources and affect historic settings such as the South Pass Historic Landscape. However, fewer than 100 acres within the planning area would be expected to be disturbed over the planning period because of locatable mineral activity, and thus any adverse impact would likely be insignificant. 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 impact on heritage resources. A plan of operations would also be required for mining operations in ACECs, and would be discussed in greater detail relative to those areas.

Recreational management actions such as implementation of public education and interpretive programs could have very significant indirect 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 prior to the expansion of facilities at the Sand Dunes OHV recreation site, minimizing the potential for any adverse impact to previously unknown resources. The projected increase in recreationists using the planning area could have the potential to affect heritage resources. Any area that experiencing increased recreational use would be closed if significant resource damage is observed.

The visual resource management (VRM) classifications 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 VRM Class II designation for these locations would require placement of structures or activities to blend in with the landscape. Any Native American respected places located within higher, VRM III or IV classifications, could be adversely affected if noticeable changes to the landscape occur. 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 viewshed for approximately 3 miles in either direction from the National Historic Trails through the South Pass Historic Landscape would have beneficial effects for recreational

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 can assist in maximizing all uses in these areas while still protecting settings important to Native Americans.

Cumulative Impacts. Cumulative impacts on heritage resources would result from surface disturbing and disruptive activities, which could damage or degrade heritage resources. Increased erosion, vibration from traffic or machinery, soil compaction, and landscape alteration can disturb heritage resources and result in a loss of potential information, integrity, and cultural value. Legal protections afforded to heritage resources and restrictions on surface disturbing activities would help offset impacts.

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 National Historic Landscape (including the Oregon, California, Mormon Pioneer, and Pony Express National Historic Trails), Boars Tusk, Crookston Ranch, and Tri-Territory Marker. Other areas may be included in the future as further NRHP-eligible sites and/or ACEC designations 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 the scientific information would be the preferred mitigation method should any such sites have to be impacted by other activities. These sites include Finley, Krmpotich, and Eden-Farson archaeological sites and the paleosol deposition area. It is anticipated that many other archaeological sites 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 eligible under Criterion D (Appendix 7).

Management actions associated with watershed quality, livestock grazing, wildlife, and vegetation would generally have indirect yet beneficial impacts on heritage resources, similar to those under the No Action Alternative. The level of development activity and AUM use would be expected to be greater, and thus there would be greater potential for impacts to heritage resources. However, impacts would remain insignificant through 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 the heritage resource.

Managing travel and access throughout the planning area could have beneficial impacts on heritage resources similar to 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 users adhere 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 would help 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, similar to the No Action Alternative. Although additional land area would be available for ROWs, the potential for significantly impacting additional heritage resources would be unlikely based on the assumed densities of sites within the planning area. As discussed above, 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 potentially could 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 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 to these resources and thus would not be allowed within one-quarter mile. Similar to the No Action Alternative, the significance of any adverse impact would depend on the significance of the resource and implementation of mitigation measures. The paleosol deposition area would be of unique significance to the planning area because of 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, similar to the No Action Alternative.

The oil shale and coal classifications would be revoked and, upon 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 would result in significant increases in mining activity. Similar to the No Action Alternative, preauthorization inventory and evaluation are not always required prior to 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 archaeological 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 insignificant.

Recreational 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, so inventory and evaluation of archeological resources would not be required. However, an indirect adverse impact could be anticipated if OHV use increases outside the recreation site

because of lack of available open area for users. The projected increase in recreationists using the planning area could have the potential to affect heritage resources, but impacts would be minimized by closing popularly used areas if resource damage would occur. However, based on the assumed densities of heritage sites within the planning area, it would be unlikely that a significant impact would result.

The VRM classifications could have adverse effects on protecting the visual quality of historic resources and Native American respected places. Most of the planning area would be classified as VRM Class IV and thus 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 of 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 viewshed of the National Historic Trail special recreation management area through South Pass would be reduced to approximately 1 mile in both directions from the 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 increased.

Cumulative Impacts. Cumulative impacts would be the same as those described in the No Action Alternative, except impacts would be greatest under this alternative because of anticipated increases in development and fewer restrictions on surface disturbing activities.

4.5.1.4 Alternative 2

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 National Historic Landscape (including the Oregon, California, Mormon Pioneer, and Pony Express National Historic Trails), Boars Tusk, Crookston Ranch, and Tri-Territory Marker. Other areas may be included in the future, as further NRHP-eligible sites and/or ACEC designations are considered.

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

Managing travel and access throughout the planning area could have beneficial impacts on heritage resources through implementation of a transportation plan that provides for maximum protection of sensitive resources. Limiting OHV use to designated roads and trails and closing more areas would minimize soil disturbance and compaction and thus minimize erosion that could expose previously unknown resources. Boars Tusk, Crookston Ranch, White Mountain Petroglyphs, and the paleosol deposition area would be closed to OHV use to protect their uniqueness.

Geophysical exploration activities would be excluded from a majority of the planning area, and thus impacts to heritage resources would be avoided.

Surface disturbing activities associated with the construction and location of ROWs could adversely impact heritage resources, similar to the No Action Alternative; however, less land area would be available for ROWs, thus the potential for significantly impacting heritage resources would be unlikely 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 potentially could be affected. Any ROWs proposed in proximity to Indian Gap, Monument Ridge, White Mountain, face of Steamboat Mountain, and Native American respected places could have adverse impacts to these resources and thus 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 discussed above, 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.

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, such as the Finley and Krmpotich sites. Because of its importance to archaeological 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 and are managed for minimum human disturbance. This designation would represent a beneficial impact to 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), saleable minerals, and coal exploration and development. This would have an overall beneficial impact on heritage resources by eliminating these surface disturbing activities.

Recreational management actions would have impacts similar to those of 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 the 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, so inventory and evaluation of archeological resources would not be required (similar to Alternative 1). However, an indirect adverse impact could be anticipated if OHV use increases outside the recreation site because of lack of available open area for users. Any adverse impacts on heritage resources due to ground disturbance from camping activities would be minimized and monitored through a permit program.

The VRM classifications would have beneficial effects on 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, and thus development would have to preserve the natural setting or blend into the existing landscape.

The management actions for special management areas would benefit heritage resources, similar to the No Action Alternative, but would have greater benefits because additional area would be designated. Existing ACECs would be expanded, and additional ACECs and a WSA would be designated to 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 viewshed of the National Historic Trail special recreation management area through South Pass to 5 miles in both directions from the 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 within the viewshed could be adversely impacted, similar to the No Action Alternative, but a larger area would be impacted.

Cumulative Impacts. Cumulative impacts would be the same as those described in the No Action Alternative, except impacts would be least extensive under this alternative because of anticipated decreases in development and increased restrictions on surface disturbing activities.

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. 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 indirect yet 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.

Implementing a transportation plan that provides for maximum protection of sensitive resources would have beneficial impacts on heritage resources by limiting surface disturbing activities. Limiting OHV use to existing and designated roads and trails, and closing some sensitive plant and wildlife areas, would minimize soil disturbance, thus minimizing erosion that could expose previously unknown resources.

Impacts on heritage resources from geophysical exploration activities would be similar to those of Alternative 2, but not as large an area would be excluded from this type of activity. Preauthorization inventory and avoidance measures would help minimize adverse impacts.

Surface disturbing activities associated with the construction and location of ROWs could adversely impact heritage resources, similar to the No Action Alternative; however less land area would be available for ROWs, thus the potential for significantly impacting heritage resources would be unlikely based on the assumed densities of sites within the planning area. 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. Any ROWs proposed in proximity to Indian Gap, Monument Ridge, White Mountain, face of Steamboat Mountain, and Native American respected places could have adverse impacts to these resources and thus would be avoided to the extent possible. As discussed above, 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.

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, such as 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 and data recovery could ensure that no adverse impacts would occur to 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 occur. Surface disturbance associated with mining claims potentially could impact archaeological and historical resources. The areas most likely to support mining activity (South Pass Summit and Steamboat Mountain) could also affect historic settings and Native American respected places and therefore would be withdrawn from mineral location. Preauthorization inventory and evaluation would not be required prior to mining operations, conducted pursuant to the 1872 Mining Act, that 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, and thus no impact would occur to this Native American rock art site.

Recreational 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 increases 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.

The VRM classifications 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, and thus development would have to preserve the natural setting or blend into the existing landscape. Any Native American respected places located with VRM Class IV areas could be adversely affected if noticeable changes to the landscape occur. However, consultation with Native American elders would help identify alternative measures to minimize any impact.

Special management areas would benefit heritage resources, as management prescriptions generally limit surface disturbing activities and other development, including communication sites. Existing ACECs would be expanded, and additional ACECs and a WSA would be designated to provide protections to sensitive resources including heritage resources. Maintaining the viewshed of the National Historic Trail special recreation management area through South Pass at 3 miles in both directions from the 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 within the viewshed could be adversely impacted as under the No Action Alternative.

Cumulative Impacts. Cumulative impacts would be the same as those described in the No Action Alternative, except impacts would be less extensive because of anticipated decreases in development and increased restrictions on surface disturbing activities.

4.5.1.6 Preferred Alternative

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 traffic or machinery, or alteration of the setting or landscape. If disturbed, heritage resources could lose potential information, integrity, and cultural value. These disturbances would adversely impact heritage resources. Federal regulations that address heritage resources require inventory, recordation, and evaluation of resources in the area of potential effect as part of the approval process for any surface disturbing activity. Resources discovered during implementation of an undertaking would be documented and evaluated for eligibility in the NRHP, and mitigation, such as data recovery, site stabilization, or other appropriate measures, would be implemented to ensure protection of resource values.

Heritage resource sites could be managed through an adaptive management strategy to ensure against adverse effects, through proper mitigation if disturbance or destruction is not avoidable. For example, the adaptive management strategy for mineral development under this alternative initially would preclude some valid existing oil and gas leases from being developed, potentially resulting in less impact to heritage resources than under the No Action Alternative. However, because of the uncertainty of the outcome of this adaptive management strategy, long-term impacts to these heritage resources may be the same or possibly greater than under the No Action Alternative. In addition, sites not eligible for the NRHP would be managed on a case-by-case basis according to their values. SHPO would be consulted under provisions of the National Historic Preservation Act, as implemented in the BLM-SHPO Protocol (Appendix 7), on any potential effects on heritage resources.

Native American traditional elders have identified a number of sites important to 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 also because adverse effects to them cannot 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. Consultation with Native American tribal representatives could delay development activities or result in changes to a project design and location, having an adverse impact on the developer.

The preferred method of managing heritage resources within the context of land development operations would be to avoid effects to heritage resources. BLM would use GIS and other technologies to place surface disturbing activities in areas least intrusive to heritage resource values. When avoidance is not possible, several mitigation measures could be applied to lessen the effects to heritage resources. Mitigation measures common to all alternatives include data recovery in the case of archaeological sites which are important because of the

scientific information they contain. Data recovery could have an indirect beneficial effect for the public, because it contributes to increased understanding and appreciation of our shared heritage.

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. Most of the impacts would most likely come from unauthorized access into the area or even from wildlife that could potentially damage sensitive geologic information. Prior to 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 may be utilized to mitigate open access to some extent, but if impacts cannot be avoided, the site would be evaluated and surveyed (as needed) by a professional paleontologist. A mitigation plan, in conjunction with an adaptive management strategy, that 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.

Land exchanges and ownership adjustments could have an adverse effect on heritage resources if such resources are located on the affected parcels. Most impacts would occur by the changing or adjustment of property boundaries. New ownership could significantly alter an existing designation because the State of Wyoming does not have extensive state laws protecting heritage resources, thus land exchanges with the state could be adversely affected by removing the property from the protection of the National Historic Preservation Act and other federal laws. In addition, 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.

Management actions associated with watershed quality, livestock grazing, wildlife, and vegetation would generally have an indirect beneficial affect on heritage resources. Implementing healthy rangeland standards, 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.

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 traffic or machinery, or alteration of the setting or landscape. The Wyoming Standards for Healthy Rangelands would direct on-the-ground management of public lands and would serve to focus the ongoing development and implementation of activity plans toward the maintenance or attainment of healthy rangelands. Overuse of an area by livestock, wildlife, and wild horses could accelerate erosion, destroying the soil matrix that could contain archaeological or historical resources. Proper construction of water developments and range improvements, and proper placement of salt and mineral supplements, would minimize any adverse impact on heritage resources. Areas would be inventoried and evaluated for heritage resources prior to any disturbance for construction of fences, water developments, and any range improvements, thus mitigating any impact. 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.

Actions associated with managing the wild horse program usually would not have any adverse impact on heritage resources. The area would be inventoried and evaluated for heritage resources prior to any disturbance, thus avoiding effects to significant 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 of horses in the Native American rock art at the White Mountain Petroglyphs site. Wild horses, for these reasons, could be considered a heritage resource, and thus their appropriate management would be a beneficial effect on traditional values.

Fire suppression efforts would have beneficial effects by protecting standing historic structures, however the use of heavy equipment and resultant 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. The prescribed burn proposed for the Pacific Creek area would not occur until archaeological remains of any wooden structures in the area are removed or protected.

Managing travel and access throughout the planning area could have beneficial impacts on heritage resources. Limiting OHV use to existing roads and trails would minimize soil disturbance, thus helping prevent exposure of buried archaeological sites. Heritage resources such as WSAs, Boars Tusk, Crookston Ranch, Special Status Plants, Oregon Buttes ACEC, and White Mountain Petroglyphs ACEC would be closed to OHV use to protect their scenic qualities and historic values.

Geophysical exploration activities could adversely affect heritage resources. Preauthorization inventory and avoidance could usually allow the geophysical operation to be conducted in a way that would avoid affecting most heritage resources.

Recreational management actions such as implementation of public education and interpretive programs could have very 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 is observed. An inventory and evaluation of potential heritage resources would be completed prior to the expansion of facilities, minimizing the potential for any adverse impact to 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.

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 removes vegetation, excavates and compacts soils, and contributes to increased erosion that could expose buried archaeological sites. Preauthorization inventory and avoidance could usually allow the operation to be conducted in a way that would avoid affecting most heritage resources. As common to all alternatives, 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 to 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.

Approximately 1,600 acres of new surface disturbance is anticipated to 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 13 sites could be potentially affected. Other types of ROWs, such as communication sites and saleable minerals operations, could result in surface disturbance and effects to the setting of sites, such as Native American respected places. Any ROWs proposed in proximity to Indian Gap, Monument Ridge, White Mountain, face of Steamboat Mountain, and around Native American respected places could have adverse impacts to 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 certain resource uses 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 species ACEC, Crookston Ranch, public water reserves, Tri-Territory Marker, and South Pass Summit would be withdrawn from mineral location prior to revocation of the oil shale and coal classifications. Preauthorization inventory and evaluation are not always required prior to some mining operations conducted pursuant to the 1872 Mining Act, thus surface disturbance associated with mining claims could have the potential to destroy archaeological 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 impact on heritage resources. A plan of operations would also be required in special management areas, which also would minimize the potential impact to heritage resources.

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 American, such as White Mountain Petroglyphs. The VRM Class II designation for these locations would require structures or activities to blend in with the landscape. Any Native American respected places located within higher, VRM III or IV classification, could be adversely affected if noticeable changes to the landscape occur. Consultation with Native American elders would help identify alternative measures to minimize 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 development, 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 viewshed of the National Historic Trail special recreation management area through South Pass at approximately 3 miles in each direction from the center of the trail would also have beneficial impacts on both the users of the trail and historic integrity of the historic trails setting. However other resource users within the viewshed could be adversely impacted.

Cumulative Impacts. Cumulative impacts on heritage resources would result from surface disturbing and disruptive activities, which could damage or degrade heritage resources. Increased erosion, vibration from traffic or machinery, soil compaction, and landscape alteration can disturb heritage resources and result in a loss of potential information, integrity, and cultural value. Legal protections afforded to heritage resources, and restrictions on surface disturbing activities, would help to offset impacts.

Cumulative impacts would be less extensive than under the No Action Alternative because of staged development and increased restrictions on surface disturbing activities.

4.6 TRAVEL MANAGEMENT, 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 Management, Access, and Realty

The land use programs of travel, access, and realty have environmental impacts on resources, and nonenvironmental effects on resource users. Impacts that implementation of these programs have to the resources and resource users are discussed in those particular resource sections. This section describes potential impacts on the land use programs of travel, access, and realty due to 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. If restrictions for the preservation of sensitive resources limit reasonable public access and use of the planning area, cause economic hardship for developers, and/or cause adverse effects to state or private inholdings, a significant impact would occur.

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

The management actions associated with the alternatives primarily would affect where and when access to and travel within the JMH planning area would be allowed, and where ROWs and other realty actions would be permitted. The limitations placed on users of the planning

area would depend on locations of sensitive resources and potential environmental impact to those resources from the types of uses.

Travel through the JMH planning area by over-the-snow vehicles would follow OHV designations and BLM trails designated for snow vehicle access. Adhering to designated routes would minimize the potential for adverse impacts to vegetation and soil conditions if snow cover would not provide adequate protection. Any effect to users would be insignificant, as existing roads and trails provide adequate access to the planning area. Exceptions for traveling off designated routes would be considered on a case-by-case basis. With mitigation, effects would be reduced or eliminated.

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 would likely result in beneficial impacts to the adjacent resources, as BLM could implement cohesive management practices and avoid fragmentation of these areas. Certain lands would not be considered for disposal unless exchanged with lands of equal or better value (including functional resource value and monetary value). This would include lands with aquatic resources and wetland and riparian habitat because of their limited value.

4.6.1.2 No Action Alternative

Transportation planning would provide for appropriate ingress, egress, and access routes that would follow BLM guidelines and road classifications defined in the Green River RMP (Appendix 12). Arterial roads would be high-traffic-volume roads that 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.

The development of a transportation plan would provide for access to private and state inholdings consistent with FLPMA and with resource protection requirements. Impacts to all users would be similar to those of industry if access would become lengthy or costly.

Existing roads and trails provide adequate vehicle access in the planning area. Anticipated development would likely create additional access routes for users of the planning area. The OHV designations of Open, Limited to Designated or Existing Roads and Trails, and Closed, as proposed in the Green River RMP, would be implemented. Implementing OHV designations would minimize adverse impacts by limiting disturbance to vegetation, watersheds, and wildlife habitat throughout the planning area. Approximately 20 percent of the planning area would remain closed to OHV use because of sensitive and unique resources (Map 9). The OHV designations would not adversely affect users because much of the planning area remains accessible (although users may have to travel farther to get to a destination).

Seasonal closures to OHV use in specific areas to protect sensitive resources could limit OHV use for short periods. Winter access throughout the planning area would be subject to seasonal road closures, and plowing of roads would be considered on a case-by-case basis. Effects on OHV users would be minimal because of the temporary nature of the limitations.

Geophysical activities would be limited to existing road and trails to minimize adverse impacts to 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 exclude or limit ROWs, including VRM classifications (Map 8), would cover approximately one-third of the planning area. VRM classifications would affect the location of new ROWs, as projects would need to be designed to meet the objectives of the established visual classification for the site and along the route. Below-ground utilities and aboveground pipelines would be compatible with VRM Class III and IV designations. These types of ROWs would not be adversely affected by VRM Class II designations provided adequate mitigation would be conducted so as not to attract the attention of the casual observer. These limited or excluded areas could create increased costs and have an adverse economic impact on users by requiring a longer route to avoid these areas. This could also have indirect adverse impacts because of additional disturbance on other resources, which could require additional mitigation and costs to construct the longer route.

Applicants for ROWs would have to avoid another 30 percent of the planning area or apply additional mitigation to protect sensitive resource values. Construction would be subject to seasonal limitations in approximately half the planning area, which could affect the amount of time needed to construct ROWs. This could adversely affect users because of the likelihood of increased project costs. An impact would be significant if the users abandon the project because the expected costs would outweigh the benefits of acquiring the ROW.

Site-specific nonlinear ROWs for microwave, transmitter, and other communication towers would not be allowed in Steamboat Mountain ACEC. This could have an adverse impact to users if alternate locations could not be found, potentially creating inefficient communication coverage of areas.

The oil shale classification would be revoked and, upon 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. The coal classification lands would be revoked and, upon revocation, the planning area would be open to location for all minerals. However, 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 prior to revocation of the coal classification. These revocations of withdrawn lands would have a beneficial effect on operators, as additional locations within the planning area would be available to mineral development (Map 5).

***Cumulative Impacts*.** Cumulative impacts would include limitations on seasonal access, OHV use, ROWs, and other surface disturbing activities, which generally increase the overall cost of managing travel, access, and realty.

4.6.1.3 Alternative 1

Transportation planning would provide for appropriate ingress, egress, and access routes that would follow BLM guidelines and road classifications defined in the Green River RMP (Appendix 12). Arterial roads would be high-traffic-volume roads that 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.

Access to private and state inholdings would be limited on a case-by-case basis to protect sensitive resources in areas of high development potential. Impact to landowners would be similar to that of other users if access would become lengthy or costly.

Existing roads and trails provide adequate vehicle access in the planning area. Anticipated development on existing and new leases would likely create additional access routes for users of the planning area. The OHV designations would be less restrictive than under the No Action Alternative, as fewer areas would be limited to designated roads and trails or have seasonal access limitations. Approximately 20 percent of the planning area would remain closed to OHV use, similar to the No Action Alternative, because the land is a WSA or a unique resource deserving of protection, such as Boars Tusk, Crookston Ranch, White Mountain Petroglyphs, and special status plant species. The facilities at the Greater Sand Dunes Recreation Area (i.e., OHV open area) would not be expanded or improved to accommodate any projected increase in users. The projected increase in oil and gas development in the immediate area could pose a health and safety risk to additional OHV users because of exposed pipelines in the shifting sands, which could have a significant adverse impact on users.

Winter access throughout the planning area would be limited only by weather and road conditions. Plowing of roads would be allowed as needed, thus seasonal limitations would not have any adverse effect on OHV users. The OHV designations would not adversely affect users, because most of the planning area would remain accessible and become more accessible with increased road development.

Geophysical activities would be allowed throughout the planning area, subject to seasonal limitations and sensitive plant species locations. 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 under the No Action Alternative. Placement of ROWs would be limited in areas designated as no surface occupancy, in exclusion or avoidance areas, by seasonal limitations, and by VRM classifications. Impacts on users would likely be less, because more land area would be available for ROWs, including Steamboat Mountain. However a user could experience an adverse economic impact if a longer, more expensive route would be required to avoid these large areas. This could also have indirect adverse impacts, because additional disturbance on other resources could require additional mitigation and related costs to construct the longer route.

The planning area would be open for site-specific nonlinear ROWs for microwave, transmitter, and other communication towers, having a beneficial effect on users of these communication services. However the visual intrusion of these facilities could adversely affect other users of the planning area.

Effects of withdrawals and revocations would be similar to those under the No Action Alternative. The White Mountain Petroglyphs, special status plant sites, Crookston Ranch, public water reserves, Tri-Territory Marker, and South Pass Summit would be withdrawn from mineral location prior to revocation of the coal classification. The revocations of withdrawn lands would have a beneficial effect on operators, as additional locations within the planning area would be available to mineral development (Map 23).

Cumulative Impacts. Cumulative impacts would be the same as those described in the No Action Alternative, except impacts would be least extensive under this alternative because of fewer restrictions on seasonal access, OHV use, ROWs, and other surface disturbing activities.

4.6.1.4 Alternative 2

Transportation planning 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 are no longer accessible by vehicles, and travel time increases because more direct routes would not be available. Travel management plans would be developed in conjunction with the overall transportation planning for JMH, specifically for Steamboat Mountain, White Mountain, the two northern birthing areas, and Essex Mountain, to control development. This could adversely affect users if access becomes too lengthy, costly, or cut off entirely, which could effectively preclude development. The transportation plan would guarantee access to private and state inholdings consistent with FLPMA and resource protection requirements.

The OHV designations of Open, Limited to Designated Roads and Trails, and Closed would be implemented. Approximately 70 percent of the planning area would be closed to OHV use because of sensitive or unique resources (Map 30). The facilities at the Greater Sand Dunes Recreation Area (i.e., OHV open area) would not be expanded or improved. This could deter users of the area, which could lessen the health and safety risks posed by oil and gas development in the immediate area and exposed pipelines in the shifting sands. The OHV designations could adversely affect users, because much of the planning area would not be accessible by vehicle and users would have to travel farther by vehicle to get to a destination, or travel by non-motorized methods.

The management actions established for new ACECs and WSAs would adversely affect travel management and access because of increased restrictions in those areas and, in the case of the WSA, complete closure of the area to vehicle travel and motorized access. The OHV designations would not cause significant impacts; however, the designations coupled with the other restrictions would likely cause significant impacts on users.

Seasonal closures to OHV use to protect sensitive resources could limit OHV use for short periods. Winter access would be limited to specific roads identified for winter use and, where access on other roads would be necessary, routes would be determined on a case-by-case basis. Plowing of roads would not be allowed except for emergencies. This would not be a significant impact on users, as most of the planning area would already be closed to OHV use and because of the temporary nature of this limitation and the limited amount of winter use.

Geophysical activities would be excluded from areas with no surface occupancy requirements and areas with sensitive or unique resource values. Areas with these designations encompass the majority of the planning area, and thus significant adverse impacts to users would be likely, as limited area would remain to conduct such activities. Seasonal limitations would also apply to these activities, further affecting exploration operations.

Applicants would be extremely limited as would opportunities for locating and routing ROWs through the planning area. Placement of ROWs would be limited in areas of sensitive or unique resources, no surface occupancy, exclusion or avoidance, seasonal limitations, and

VRM classifications, which affect a majority of the planning area. Impacts on users would be significant, as ROW locations would be extremely limited, and it would likely be uneconomical to locate a ROW through the planning area with adequate mitigation or to avoid sensitive resources.

Site-specific nonlinear ROWs for microwave, transmitter, and other communication towers would not be allowed in special management areas, which are generally the highest elevations within the planning area. This could adversely affect communication signals if alternate locations cannot be found.

The entire JMH planning area would be withdrawn from locatable minerals. This would have an adverse effect on the users, because no areas would be available on for filing of mining claims, exploration, or development.

***Cumulative Impacts*.** Cumulative impacts would be the same as those described in the No Action Alternative, except impacts would be greatest under this alternative because of increased restrictions on seasonal access, OHV use, ROWs, and other surface disturbing activities. Development of a transportation plan may help reduce cumulative impacts by facilitating management of travel and access.

4.6.1.5 Alternative 3

Transportation planning would follow BLM guidelines and road classifications to provide maximum protection for crucial habitats and sensitive resources. This would limit access via 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 are no longer accessible by vehicle, travel time increases because more direct routes would not be available, or construction and maintenance of roads to meet management objectives would be 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 becomes too lengthy, costly, or effectively precludes development.

The development of a transportation plan would provide for access to private and state inholdings consistent with FLPMA and with resource protection requirements. Impacts to landowners would be similar to those of other users if access would become lengthy or costly.

Existing roads and trails would provide adequate vehicle access in the planning area, and anticipated future development would likely create additional access routes for users of the planning area. Implementation of OHV designations would minimize adverse impacts by limiting disturbance to vegetation, watersheds, and wildlife throughout the planning area (Map 41). Approximately 30 percent of the planning area would be closed to OHV use because of sensitive or unique resources. Facilities at the Greater Sand Dunes Recreation Area (i.e., OHV open area) would not be expanded or improved, similar to Alternatives 1 and 2. This could deter users of the area, which could lessen the health and safety risks posed by oil and gas pipelines exposed in the shifting sands. Users would not be adversely affected because much of the planning area remains accessible (although users may have to travel farther to get to a destination).

Seasonal closures to OHV use in specific areas to protect sensitive resources would limit OHV use for short periods. Winter access would be limited to specific roads identified for winter use and in accordance with transportation planning requirements as necessary. Plowing would be allowed as needed. Any adverse effect on OHV users would be minimal because of the temporary nature of these limitations.

The management actions established for new ACECs and WSAs would adversely affect travel management and access because of increased restrictions in those areas and, in the case of the WSA, complete closure of the area to vehicle travel and motorized access. Management actions for the lands themselves would not cause significant impacts; however, the designations coupled with other restrictions would likely cause significant impacts on users.

Geophysical activities would be excluded from areas with no surface occupancy requirements (Map 39) and sensitive or unique resource values, similar to Alternative 2. Significant adverse impacts to users would be likely if these designations effectively preclude 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 for locating and routing ROWs under this alternative than under the No Action Alternative. Placement of ROWs would be limited (Map 40) in areas with sensitive or unique resources (Map 40), by seasonal limitations (Map 39), and by an increase in areas designated as VRM Class II (Map 47). Additional mitigation measures to protect sensitive resource values could be applied on a case-by-case basis in areas designated as ROW avoidance. Construction would be subject to VRM classifications and seasonal limitations in approximately half the planning area, which could affect the amount of time needed to place utilities in ROWs. This could adversely affect users because of the likelihood of increased project costs. An impact would be significant if the users abandon the project because the expected costs would outweigh the benefits of acquiring the ROW. Exceptions may be granted which would lessen this effect (Appendix 4).

Site-specific nonlinear ROWs for microwave, transmitter, and other communication towers would not be allowed on Steamboat Mountain, Continental Peak, or in the Oregon Buttes ACEC. This could adversely affect communication signals if alternate locations cannot be found. However, Essex Mountain and Pacific Butte would be considered for such ROWs.

Withdrawals and revocations of lands identified in the Green River RMP would be pursued and would remain in place during the analysis period. The planning area would be open to location for all minerals, except for special status plant sites, Crookston Ranch, public water reserves, Tri-Territory Marker, South Pass Summit, northern elk birthing areas, and a 5-acre site for recreational mining in the Oregon Buttes-Dickie Springs area. These withdrawn lands could have an adverse effect on users by limiting the available area open to mineral development, but with the revocation of the coal and oil shale withdrawals, and approximately 75 percent of the planning area open to mineral location, and the designation of a popular area for recreational mining use, any impact would be insignificant.

Cumulative Impacts. Cumulative impacts would be the same as those described in the No Action Alternative, except impacts would be greater because of increased restrictions on seasonal access, OHV use, ROWs, and other surface disturbing activities. Development of a

transportation plan may help reduce cumulative impacts by facilitating management of travel and access.

4.6.1.6 Preferred Alternative

The management actions associated with the alternatives would primarily affect where and when access to and travel within the JMH planning area would be allowed and where ROWs and other realty actions would be permitted. The limitations placed on users of the planning area would depend on locations of sensitive resources and potential environmental impact on those resources from the types of uses.

Travel through the JMH planning area by over-the-snow vehicles would follow OHV designations and BLM trails designated for snow vehicle access. Adhering to designated routes would minimize the potential for adverse impacts to vegetation and soil conditions if snow cover would not provide adequate protection. Any effect to users would be insignificant, as existing roads and trails provide adequate access to the planning area. Exceptions to travel off designated routes would be considered on a case-by-case basis. With mitigation, effects would be reduced or eliminated.

Transportation planning 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 are no longer accessible by vehicles and travel time increases because more direct routes would not be available. Compared to the No Action Alternative, the Preferred Alternative proposes that roads and improvements follow the Green River RMP management objectives. Travel management plans would be developed in conjunction with the transportation planning for JMH, specifically for Steamboat Mountain, White Mountain, the two northern calving areas, and Essex Mountain areas, to control development. This could adversely affect users if access becomes too lengthy, too costly, or cut off entirely, which could effectively preclude development. The transportation plan would guarantee access to private and state inholdings consistent with FLPMA and resource protection requirements.

Existing roads and trails provide adequate vehicle access in the planning area. Anticipated development would likely create additional access routes for users of the planning area. Other access routes may be closed or have restricted use during key periods, which may limit access in specific areas.

Seasonal closures to OHV use in specific areas to protect sensitive resources could limit OHV use for short periods. Winter access throughout the planning area would be subject to seasonal road closures, and plowing of roads would be considered on a case-by-case basis. Effects on OHV users would be minimal because of the temporary nature of the limitations.

Geophysical activities would be allowed throughout the planning area subject to appropriate mitigation and limitations applied to ROWs (Map 49). Activities would not be allowed within one-half mile of the pinnacles geologic feature and would be allowed in sensitive resource areas only if they can be performed with acceptable mitigation of impacts.

Adverse impacts to users due to limitations would be likely; 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. The extent of ROW exclusion and avoidance areas is shown on Map 49. VRM classifications would also affect the location of new ROWs, as projects would need to be designed to meet the objectives of the established visual classification for the site and along the route. The limitations of keeping linear ROWs coordinated with existing roads, trails, and easements as well as VRM classifications, could affect specific placement of ROWs and access to future development locations. Possible effects to the location of ROWs could result from logistical difficulties in utilizing an existing road, trail, other ROW, and/or easement of unfavorable geography, proximity, or VRM classification. The level of effect would be dependent 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.

The oil shale classification would be revoked and, upon revocation, the planning area, with exception of White Mountain Petroglyphs, would be open to the filing of mineral claims, exploration, and development of locatable minerals. The coal classification lands would be revoked and, upon revocation, the planning area would be open to location for all minerals. However, 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 prior to revocation of the coal classification. These revocations of withdrawn lands would have a beneficial effect on operators, as additional locations within the planning area would be available to mineral development (Map 53).

Land adjustments and exchanges identified in the Green River RMP would be pursued, including the exchange of state lands within WSAs and other special management areas. Acquiring state inholdings would likely result in beneficial impacts to the adjacent resources, as BLM could implement cohesive management practices and avoid fragmentation of these areas. Certain lands would not be considered for disposal unless exchanged with lands of equal or better value (including functional resource and monetary value). This would include lands with aquatic resources and wetland and riparian habitat, because of their limited value.

Cumulative Impacts. Cumulative impacts would include limitations on seasonal access, OHV use, ROWs, and other surface disturbing activities, which generally increase the overall cost of managing travel, access, and realty. Development of a transportation plan may help reduce cumulative impacts by facilitating management of travel and access.

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.

4.7 RECREATION RESOURCES

BLM-administered lands are managed to provide broad opportunities for many different types of recreational 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 on resource users. Impacts that implementation of recreation management actions have to the resources and resource users are discussed in those particular resource sections. This section describes potential impact on recreation resources or opportunities because of the implementation of management actions for other resource management categories.

An impact on recreation resources would be significant if an activity would result in elimination or reduction of recreation use in any area or would compromise public health and safety. Significant impacts would also occur if a level of development occurs that would be incompatible with the stated objectives of special recreation management areas or if activities occur that would have a direct or indirect effect on wilderness suitability.

For analysis purposes, it is assumed that recreation activity levels would vary by each alternative and would be related to how much recreational opportunity would be created or lost because of other projected development and activities. The specific assumptions 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. Large-scale recreation facilities or developments would not be constructed during the planning period. Hunting for elk is assumed to remain constant for all alternatives except Alternatives 1 and 2, where the number of hunting days are expected to increase because of dispersion of animals and decreased access. Other big game and Greater Sage-Grouse hunting would remain constant.

4.7.1.1 Common to All Alternatives

Management of land and water resources would not have significant impacts on recreation resources. The 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 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.

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, including protection of Native American respected places, 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.

The management actions associated with the alternatives primarily would affect where and when access to and travel within the JMH planning area would be allowed, and where recreation use would be permitted. The limitations placed on users of the planning area would depend on locations of sensitive resources and the potential environmental impact on those resources from the types of uses.

4.7.1.2 No Action Alternative

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 users by protecting riparian areas used for camping and fishing and by maintaining the cultural integrity of the trails.

Existing roads and trails provide adequate vehicle access in the planning area for recreational purposes. OHV designations would minimize adverse impacts on recreation resources by limiting disturbance to vegetation, watersheds, and wildlife. Approximately 20 percent of the planning area would remain closed to OHVs because the land is a WSA or a recreational resource, such as Boars Tusk, Crookston Ranch, and White Mountain Petroglyphs. A recreational 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, 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 impact recreation resources. Land clearing, grading, construction, and drilling activities would create dust, noise, and increased traffic. These activities could have adverse impacts on recreational uses because they would be visually and audibly apparent to the recreational experience. The level of significance of any impact on recreation resource users would depend on the proximity to the development. Users could be inconvenienced if ROW construction impedes access to recreational activities, however any impact would not likely be significant because of the temporary nature of the construction. The visual intrusion of these structures 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 as additional locations would be available for recreational mining activities.

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

VRM classifications provide the planning mechanism to maintain or improve scenic quality by managing the effects of human activities and other intrusions on the visual landscape. These classifications would have beneficial effects on the 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 recreational 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 recreational 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 recreational opportunities.

***Cumulative Impacts*.** Cumulative impacts could include increased recreational demand and uses to a point where conflicts would occur for unconfined dispersed recreational opportunities. Development activities would degrade and/or restrict some recreational experiences through visual impacts, noise, and public health and safety concerns. Restrictions on access and use may reduce recreational opportunities for some users but enhance the experience of those who desire solitude. Some hunting opportunities may diminish in areas where development occurs because of the displacement of animals and because of measures applied to protect public health and safety.

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 would be altered such as to impact the recreational experience.

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 under the No Action Alternative, as fewer areas would be limited to designated roads and trails or have seasonal access limitations. This could have adverse effects on users that prefer non-motorized forms of recreation.

Leaseholders and applicants for ROWs would have greater flexibility and opportunity for oil and gas development and for locating and routing ROWs in the planning area than under the No Action Alternative. Construction and drilling activities would create more dust, noise, and increased traffic that could have adverse impacts on recreational uses to a greater extent than under the No Action Alternative. However, the level of significance of any impact on recreation resource users would depend on the proximity of the recreational activity to the development. There could be adverse impacts on recreation users if ROW construction impedes access to recreational activities, but any impact would be temporary and insignificant. Recreation users could be adversely impacted by increased development 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 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 recreational activities such as hunting and wildlife viewing. The significance of any impact on recreation resources and resource users would depend on the extent the recreational opportunity could be reduced.

Although most of the planning area would be open to mineral location, areas of notable recreational 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 having the remainder of the planning area available for recreational mining use activities.

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

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

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

Cumulative Impact. Compared to the No Action Alternative, unconfined dispersed recreation and hunting resources would be degraded because of anticipated increases in development activities and fewer land resource protections, which would increase the potential for conflicts among users. Because of public health and safety concerns, access for recreational activities would be further restricted as areas of oil and gas development increase. Increased access to undeveloped areas and fewer restrictions on recreational uses under this alternative may offset this impact but could degrade the experience of those who desire solitude.

4.7.1.4 Alternative 2

This alternative would provide fewer opportunities for development activities, and thus surface disturbance and construction of facilities would be curtailed, which would likely benefit dispersed recreation resources and resource users.

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 other alternatives by ensuring protection of riparian areas used for camping and fishing and by maintaining the cultural integrity of the trails.

Approximately 70 percent of the planning area would be closed to OHV use (Map 30). These designations could have a beneficial effect on those recreationists that prefer non-motorized forms of recreation.

The projected decrease in the level of mineral development activities and limitations on ROWs from the No Action Alternative would reduce impacts on recreation resources and certain recreation users. 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 of the No Action Alternative or Alternative 1, thus any adverse impacts on recreational uses due to visual or audible disturbances to the recreational experience would not be significant.

Although additional development roads and well facilities would be likely, overall there would be less 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 other than by nonmotorized means.

The entire JMH planning area would be withdrawn from mineral location. This would have an adverse effect on users because no areas would be available on which to conduct recreational use mining activities.

Recreation resources and resource users would be expected to benefit from increased recreational planning. Recreational project and site plans and interpretive signs for the backcountry byways, historical sites, and numerous viewing areas would have greater beneficial effects on the recreational experience than under the No Action Alternative and Alternative 1, because plans would be prepared and implemented under this alternative 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 via 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 JMH 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.

VRM classifications under this alternative 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. Beneficial impacts would be greatest under this alternative because of increased designations of more restrictive VRM classifications.

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

Cumulative Impacts. Compared to the No Action Alternative, unconfined dispersed recreation and hunting resources would be enhanced because of anticipated decreases in development activities and increased land resource protections, which would reduce the potential for conflicts among users. Decreased oil and gas development would also allow for

more recreational opportunities in areas where such development is prohibited. However, management actions that restrict access to protect important or sensitive resources could decrease recreational opportunities for some users, but could enhance the experience of those who desire solitude.

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 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 that prefer nonmotorized forms of recreation, similar to the No Action Alternative.

The projected decrease in the level of mineral development activities and limitations on ROWs from the No Action Alternative would likely reduce impacts on recreation resources and certain recreation users. The overall recreation experience in the planning area could likely be enhanced because of protection of sensitive resources that attracts recreationists to the area. Potential adverse impacts because of visual or audible disturbances to the recreational experience could occur from construction and drilling activities, but would not likely be significant because of the temporary nature of these activities. Although mineral development facilities would have a long-term visual intrusion on the landscape that could affect recreation resource users, any impact would be site-specific and not likely affect recreationists outside the viewshed of each facility.

Although most of the planning area would be open to mineral location, areas of notable recreational 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, similar to the No Action Alternative. The lava area of Steamboat Mountain and the northern area used for elk calving would also be withdrawn from mineral location. Recreational mining activity (i.e., gold panning) 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 recreational 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.

Increased recreational 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 via a permit program for parties of 10 or more to minimize potential adverse impacts on other resource values. Similar to Alternative 2, special recreation use permits for managed activities proposed for the JMH 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.

VRM classifications 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. 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 to ACECs and WSAs would significantly benefit the recreation resources by providing an increase in areas for solitude and primitive recreational opportunities as a result of the amount of land area and resources receiving protection under these designations.

Cumulative Impacts. Cumulative impacts would be the same as those described in Alternative 2, except impacts would be less extensive.

4.7.1.6 Preferred Alternative

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 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 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.

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, including protection of Native American respected places, 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.

The management actions associated with this alternative primarily would affect where and when access to and travel within the JMH planning area would be allowed, and where recreation use would be permitted. The limitations placed on users of the planning area would depend on locations of sensitive resources and potential environmental impact on those resources from the types of uses.

This alternative would provide fewer opportunities to develop the planning area, and thus surface disturbance and construction of facilities would be curtailed, which would likely benefit dispersed recreation resources and resource users.

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 Alternatives 2 and 3, by ensuring protection of riparian areas used for camping and fishing and by maintaining the cultural integrity of the trails.

Existing roads and trails provide adequate vehicle access in the planning area for recreational purposes. OHV designations would minimize adverse impacts on recreation resources by limiting disturbance to vegetation, watersheds, and wildlife. Approximately 20 percent of the

planning area would be closed to OHV use because the land is a WSA or a recreational resource, such as Boars Tusk, Crookston Ranch, and White Mountain Petroglyphs. A recreational 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.

The projected decrease in the level of mineral development activities, and limitations on ROWs, would likely reduce impacts on recreation resources and certain recreation users. The overall recreation experience in the planning area could likely be enhanced because of protection of sensitive resources that attracts recreationists to the area. Potential adverse impacts due to visual or audible disturbances to the recreational experience could occur from construction and drilling activities but would not likely be significant because of the temporary nature of these activities. Although mineral development facilities would have a long-term visual intrusion on the landscape that could affect recreation resource users, any impact would be site-specific and not likely affect recreationists outside the viewshed of each facility.

Although most of the planning area would be open to mineral location, areas of notable recreational 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, similar to 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 are not withdrawn from mineral location or where such withdrawals would not be pursued.

Increased recreational planning would benefit recreation resources and resource users as described in Alternative 2. Dispersed camping would be allowed under the Preferred Alternative as long as these activities do not cause damage to other resources. Special recreation use permits for activities proposed for the JMH 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 recreational activities, thus any impact on users would be negligible.

The VRM classifications 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. Impacts would be slightly greater than for the No Action Alternative because of increased designations of more restrictive VRM classifications.

Management prescriptions associated with additions of special management areas would significantly benefit the recreation resources by providing an increase in areas for solitude and primitive recreational opportunities because of the amount of land area and resources receiving protection under these designations.

Cumulative Impacts. Cumulative impacts could include increased recreational demand and uses to a point where conflicts would occur for unconfined dispersed recreational opportunities. Development activities would degrade and/or restrict some recreational experiences through visual impacts, noise, and public health and safety concerns. Restrictions on access and use may reduce recreational opportunities for some users but

enhance the experience of those who desire solitude. Some hunting opportunities may diminish in areas where development occurs because of the displacement of animals and because of measures applied to protect public health and safety.

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.

The impacts that implementing mineral management actions would have on other resources and resource users are discussed in those particular resource sections. This section describes potential impacts on mineral development (i.e., by industry) due to the implementation of management actions for other resource management categories and the development activity expected for each mineral resource under each alternative. These activity level projections also provide the basis for assessing impacts to the environment and other resource uses.

Impacts of management actions on resource development activities occur when management actions prohibit development of economically viable resources or when management actions render development economically unviable or infeasible. The relative impacts of management actions are identified by projecting changes in development activity within the planning area for the different management actions. These management actions may impact the individual resource user, such as a lease operator, when a management action results in a projected change in development activity. The significance of the impact depends on the resulting change in overall development levels, which would be dependent on the amount of production affected by the management actions. Exploration and production activity within JMH also would be affected by factors other than management actions, such as commodity prices. The analysis of impacts compares the projected development levels with consistent assumptions for oil and gas prices and other economic factors.

Management actions or mitigation requirements are not considered significant where development of the resource is still feasible and economically viable. Management actions that change development opportunities or compliance costs are not considered significant where there is not an identifiable interest or potential for development of a resource. The potential for resource development is based on the assessment of resources in the planning area and the economic viability of development independent of compliance and mitigation costs.

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. The assumption and analysis guidelines listed above were utilized to assess impacts under all the alternatives. Generally, a 20-year period with the base year as 2001 was used in preparing assumptions for each resource. It is also assumed that the 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.

4.8.1 Potential Impacts on Leasable Fluid Minerals

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

Oil and Gas. The Nitchie Gulch unit/field area is currently developed on 160-acre spacing, whereas the rest of the planning area is on a 640-acre spacing. Up to 38 new production wells would be drilled in this field, with a maximum well density of 6 wells per square mile. This development is expected to occur over the first 5 years of the planning period. Any new fields discovered in the future would initially be developed on a 640-acre spacing, with additional production wells drilled at a spacing of 160 acres per well.

Produced water disposal methods are expected to be by reinjection or disposal pits (estimated at 0.1 acre each). The Wyoming Department of Environmental Quality water quality standards require considerable treatment of most discharged water to meet regional water quality requirements, and discharge of produced water is not considered viable because of the costs and feasibility of water treatment in the planning area.

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 the active wells. Based on the production history of wells in the planning area, the average estimated ultimate gas recovery is expected to be 2.2 billion cubic feet per well. Decline curve analysis indicates that the average well would produce about 2.2 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 oil-condensate production (oil to condensate ratio) was assumed to remain similar to its present ratio. At this ratio an average well would produce 117 barrels of oil-condensate each year. Because of the relatively small production rates of condensate, these resources are not evaluated in the total production estimates for the planning area.

Surface Disturbance. The following disturbance rates are assumed for access roads, drillpads, and pipelines and powerlines 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 for existing regulations on 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 Powerlines:

- 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 firefighting 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 methane wells drilled to depths greater than 1,200 feet would require 0.75 to 1 acre-feet of water consumption.

Coalbed Methane. Currently there is no active coalbed methane production in the planning area because of low gas prices and water disposal costs. No coalbed wells are expected to be drilled until after 2002. During the 2002–2022 planning period, a maximum of 50 coalbed methane wells in two exploration projects are projected. Each project would include up to 16 dewatering wells and 9 gas wells. A total of 18 gas-producing wells would be drilled in the two exploration projects.

No production rate assumptions were made for coalbed methane; no production history is available to make a reasonable assessment at this time. Coalbed methane wells produce at 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 methane wells for access roads, drill pads, and pipelines and powerlines.

Expected water production rates associated with coalbed methane 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 the Colorado River Basin Commission regulations on salinity control. Because the area with high coalbed methane potential is located within the Colorado River Basin, these requirements are assumed to apply to all coalbed methane 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 production.

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, which result in impacts to the use of the resources while providing additional protection of the environment. These restrictions impact development by increasing the costs of development activities. Areas impacted by restrictions or prohibitions on mineral development are listed in Tables 4-3 to 4-8 at the end of Chapter 4.

Where incremental costs result 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 may recoup some or all of the expenditures for a right by selling their interest to another operator if there is a willing buyer. Mitigations could result in nonenvironmental impacts on the 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 more highly valued commodities economically unviable. 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, alternate sources with lower compliance costs would likely be developed first. Because the costs 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 the site-specific analyses are performed. The comparison of management alternatives assumes that increased resource mitigation generally results in increased costs for activities.

Areas where energy and mineral development are prohibited because of nondiscretionary closures, could contain resources that 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 to the resource users. Areas closed to development or with cumulative restrictions that would prevent development are considered in the impacts on the 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 Chapter 4), respectively. These expected levels of surface disturbance and traffic volumes provide the basis for assessing potential impacts to 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, over 198,000 acres would be closed (including about 117,000 acres of existing nondiscretionary closure) to new leasing (Map 10). Nearly 379,000 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, 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 over 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 are developed and held by production. Any reduction in development activity would occur as existing leases in the core area expired and would not be reoffered for lease. Based on the predicted drilling and completion rates for the parts of the planning area that are currently leased or 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 to 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. Because this alternative would represent a loss of development potential in the core area where there are no planning decisions to support leasing, this may represent a significant impact to individual operators of oil and gas developments.

No coalbed methane project has currently proven to be economic in the Wyoming part of the Greater Green River Basin. Existing information indicates that there is potential for coalbed methane development based on available geologic information. 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 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 show that coalbed methane development would be economically feasible, well life could be 10 to 20 years based on information on coalbed methane 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 methane are completed in the planning area, then the actual production rates and the acreage of areas available for coalbed methane development could be used to estimate production rates. Impacts under the No Action Alternative for coalbed methane 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 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 represent a loss of development potential in the core area where there are no planning decisions to support leasing, this may represent a significant impact to coalbed methane development if significant coalbed methane resources are present in the core area.

4.8.1.3 Alternative 1

Over 117,000 acres would remain closed to leasing (Map 20). Approximately 460,000 acres are 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 70 development wells, and development drilling in existing producing areas would be expected to result in drilling 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 be 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 methane 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, similar to the No Action Alternative and Alternative 3. Impacts to coalbed methane development actions under Alternative 1 would include reduced costs compared to the No Action Alternative, because fewer resource protection stipulations would be required. This would be a positive impact on coalbed methane development and provides 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 should be closed to leasing for protection of sensitive resources (Map 31). Over 534,000 acres would be closed to oil and gas development, and almost 45,000 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. While 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. 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 to oil and gas development, with the greatest area closed to additional development than under any alternative.

Areas closed to oil and gas leasing also would not be available for coalbed methane development. Because a large part of the planning area with potential for coalbed methane development contains sensitive resources, it is assumed that only one coalbed methane 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 to coalbed methane development under this alternative include less area available for leasing and development compared to the No Action Alternative, and increased costs associated with resource protection requirements in lease stipulations compared to Alternative 1. This alternative would result in significant impacts to coalbed methane development, with the greatest area closed to additional development than under 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 to sensitive resources in the planning area. In addition, over 126,000 acres would be closed (including 117,000 acres of existing nondiscretionary closures) to new leasing and development, with approximately 451,000 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 would occur 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 JMH, including 115 exploration wells and a total of 69 development wells, with 107 new wells placed into production (Appendix 13).

The impacts to oil and gas development under this alternative include a net increase in restricted areas compared to the No Action Alternative. Although additional development may occur related to lease offerings in the core area, additional areas would be closed to future leasing as an additional WSA is established and additional restrictions applied. Resource protection requirements would also be implemented under this alternative, and the associated compliance costs would represent an increased impact to development compared to Alternative 1. The expected level of development under this alternative could represent significant impacts to development, with some loss of areas to development and restrictions on the timing of development activity that may result in lost opportunities for economically viable development, depending on the trends in the sensitive resource indicators monitored as part of adaptive management.

The coalbed methane 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 may decrease interest in development of coalbed methane 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 potential area with development potential could be leased and explored outside sensitive resource areas. Any reduction in development related to access restrictions

and costs associated with mitigation requirements would probably impact later development activity, which cannot be estimated from currently available information because there is no development history for coalbed methane production in the planning area.

4.8.1.6 Preferred Alternative

The Preferred Alternative provides for controls on leasing and levels of drilling activity to prevent irreversible adverse impacts to sensitive resources in the planning area. In addition, over 142,000 acres would be closed (including about 117,000 acres of existing nondiscretionary closure) to new leasing and development, with just over 434,000 acres available for oil and gas development (Map 54). The overall level of activity would be managed through an adaptive management strategy (Appendix 17) which would reinstate some suspended leases, continue suspension of some existing leases, and offer leases in sensitive areas with stipulations to control the timing of development activities to ensure that sensitive resources are protected. The timing of new lease offerings and the schedules for development on leases with timing stipulations would be based on observations of resource indicators, such as wildlife populations and distribution. The impacts of nondevelopment factors, such as disease and drought, will also be considered in the determinations of development schedules.

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 would occur at a level near the maximum rate observed for a 5-year period, a maximum rate of drilling activity can be projected. At a rate of 46 wells per 5-year period, an additional 205 wells could be drilled in JMH, including 115 exploration wells and a total of 69 development wells, with 107 new wells placed into production.

The impacts to oil and gas development from this alternative include a net increase in areas available for development compared to the No Action Alternative. Resource protection requirements required by lease stipulations would also be implemented under this alternative, and the associated compliance costs would represent an increased impact to development compared to Alternative 1. The expected level of development under this alternative could represent significant impacts to development depending on the results of the adaptive management strategy, which would determine the level and timing of development acceptable for maintaining use of the planning area.

The coalbed methane 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 may decrease interest in development of coalbed methane resources by industry, the initial two exploration projects and 50 wells anticipated for Alternative 1 could be carried out within the planning area. Any reduction in development related to access restrictions and costs associated with mitigation requirements would probably impact later development activity, which cannot be estimated from currently available information because there is no development history for coalbed methane production in the planning area.

4.8.2 Leasable Solid Minerals

Potential leasable solid minerals in the planning area include coal, oil shale, sodium (brine), and potash.

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 may occur within the planning area to evaluate future coal development potential. If coal exploration occurs 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 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 along existing roads and trails and overland. The amount of disturbance is expected to be between 10 and 15 acres and 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 subsurface mining with controls on surface facilities, or no surface occupancy.

4.8.2.2 No Action Alternative

Under the No Action Alternative, approximately 15,000 acres of the coal potential area are closed to leasing. Another 14,000 acres of the coal potential area would be available for subsurface mining with controlled surface facilities. Fewer than 50 acres would be available for coal leasing with no surface occupancy requirements. If exploration activities in other parts of the planning area identify coal resources with economic potential, the area could be leased if it is determined to be suitable for development under the screening process. Over 273,000 acres of the planning area outside the coal potential 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 impact 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. No development activity is expected in JMH during the planning period because of the lack of commercial deposits and/or

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 8,700 acres open to subsurface mining with controlled surface facilities. In the rest of the planning area, over 117,000 acres are closed to exploration activity because of special management areas, and other resources protected by existing mitigation. No development activity is expected in JMH during the planning period because of the lack of commercial deposits and/or existence of economic resources outside the planning area that are more favorable for development. Therefore the closures to leasing and exploration represent a loss of opportunity to conduct these activities. However, 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 coal potential area to leasing, with over 46,000 acres no longer available for leasing. The entire planning area (approximately 622,000 acres) would be closed to exploration activity. No development activity is expected in JMH during the planning period because of the lack of commercial deposits and/or existence of economic resources outside the planning area that are more favorable for development. Therefore the closures to leasing and exploration represent a loss of the opportunity to conduct these activities. However, 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 15,000 acres in the coal potential area, with approximately 14,000 acres open to subsurface mining with controlled surface facilities. In the rest of the planning area, about 313,000 acres are 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 available under the No Action Alternative, while an additional 23,000 acres is closed to coal exploration under this alternative. No development activity is expected in JMH during the planning period because of the lack of commercial deposits and/or existence of economic resources outside the planning area that are more favorable for development. Therefore the closures to leasing and exploration represent a loss of the opportunity to conduct these activities. However, impact is not expected in development of these resources because development is not considered likely during the planning period.

4.8.2.6 Preferred Alternative

The management actions under the Preferred Alternative close approximately 15,000 acres in the coal potential area, with approximately 27,000 acres open to subsurface mining with controlled surface facilities. In the rest of the planning area, about 290,000 acres are closed to exploration activity as required for special management areas and other resources protected by existing regulations. No development activity is expected in JMH during the planning period because of the lack of commercial deposits and/or existence of economic resources outside the planning area that are more favorable for development. Therefore the closures to

leasing and exploration represent a loss of the opportunity to conduct these activities. However, impact is not expected in development of these resources because development is not considered likely during the planning period. .

4.8.3 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 placers. 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 the 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 and to search for diamonds. It is anticipated that such exploration may occur during the planning period. Access to the top of Steamboat Mountain is limited, therefore exploration may consist of helicoptering a drill rig to the top of Steamboat Mountain to gather the required information. About 2 acres of disturbance would be anticipated from these activities.

Locatable minerals considered to have no foreseeable development potential in the planning area include uranium and metallic mineral deposits such as 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. Operations that disturb more than 5 acres or any area in special management areas must file plans of operation. Reclamation plans would be developed and bonds posted. 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 under the No Action Alternative. Over 143,000 acres are withdrawn from all mineral location. There are currently active claims in the Dickie Springs/Oregon Gulch

area of JMH, and exploration activity on these claims has typically disturbed 1 to 5 acres at a time related to trenching with a backhoe or manual tools for exploration. 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 under the No Action Alternative on the areas that have not been withdrawn from mineral location, there will be no additional impacts to 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 is discovered in the planning area. There is no sufficient information to evaluate the potential for development of a diamond find. There are no anticipated impacts to 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, over 143,000 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 under Alternative 1 on the areas that have not been withdrawn from mineral location, there will be no additional impacts to exploration and mining of locatable minerals.

Similar to 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 is discovered in the planning area. There is no sufficient information to evaluate the potential for development of a diamond find. There are no anticipated impacts to 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 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 related to trenching with a backhoe or manual tools for exploration. 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 only occur if an existing claim were found to be valid and is 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 to 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 also be lost under this alternative.

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

4.8.3.5 Alternative 3

Under Alternative 3, over 153,000 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 the 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 have 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 to diamond exploration and mining would be similar to that of Alternative 2, since the highest potential area would be withdrawn from mineral location. The management action for locatable minerals would also include a designated area for recreational mining in the Dickie Springs/Oregon Gulch District.

4.8.3.6 Preferred Alternative

Under the Preferred Alternative, just over 148,000 acres would be withdrawn from mineral location. Active claims cover large areas within the proposed withdrawal areas. Those claims would be evaluated, and any claims determined invalid would be declared null and void. However, development of existing or new claims would be allowed under the Preferred Alternative for the areas that have 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 to 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. Withdrawals would be pursued for the northern elk calving areas, and the potential diamond mining area of Steamboat Mountain ACEC.

4.8.4 Saleable 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 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. Over 225,000 acres of the planning area are closed to mineral 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 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 saleable minerals in areas with other sensitive resources, such as special status plant species. Seasonal restrictions may also be placed on development activities to avoid time-sensitive impacts to wildlife, such as 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 to mineral material sales under the No Action Alternative are 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 may be significant where site-specific requirements result in a mineral development not being economically viable.

4.8.4.3 Alternative 1

Approximately 162,000 acres of the planning area are 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 to 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 to 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 of the other alternatives considered in this analysis. The loss of area with development potential from mineral sales would result in significant impacts where there is 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 also be closed. More than 220,000 acres would be closed under this alternative. Although this provides for more areas 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 the Steamboat Mountain ACEC. Some limited talus and landslide deposits could be developed for construction materials, provided the site-specific analysis required for the sale does not identify any unacceptable impacts. The overall impact to development of mineral materials under this alternative would be greater than the No Action Alternative, because additional closures would be implemented in the areas most favorable for development of the resource.

4.8.4.6 Preferred Alternative

In addition to the areas closed to mineral materials sales under the No Action Alternative, the Steamboat Mountain ACEC, including the lava portion (except when required to meet other planning objectives), the Pinnacles geologic feature, and the area within one-half mile of Greater Sage-Grouse leks, would be closed to mineral material sales, with over 341,000 acres closed under this alternative. Other sales in the planning area would be carried out where needed to meet planning objectives for the area (for example, construction of recreational facilities) and where site-specific analyses show that there are not unacceptable impacts from the sale of mineral materials. Some limited talus and landslide deposits could be developed for construction materials, provided the site-specific analysis required for the sale does not identify any unacceptable impacts. The overall impact to development of mineral materials

under this alternative would be greater than 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 is 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 it 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.

4.8.6 Cumulative Impacts

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 to mineral and energy resources.

4.8.6.1 No Action Alternative

Oil and gas development is expected to increase from current conditions. However some growth in development would be prohibited or curtailed as a result of conflicts with environmental-related resource values. Acreage closed to additional leasing would total 198,210 acres, or about 32 percent of JMH. When combined with the Green River Management Area (minus overlapping land areas), which presently restricts oil and gas leasing on 383,370 acres, about 9 percent of the 5.3 million acres will be restricted. Restrictions could have a significant impact on local lessees and operators. Production would be expected to increase slightly under this alternative from current levels. Restrictions on ROWs could limit operator ability to develop and move product from within the planning area, and may also disrupt regional planning associated with gas collection and delivery systems.

4.8.6.2 Alternative 1

Restrictions on leasing would be eased, with new leasing allowed to follow industry interest except in WSAs. Acreage closed to leasing would decrease from 198,210 under the No Action Alternative to 117,160. 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. When combined with the larger Green River Management Area, benefits would be greater than those under the No Action Alternative.

4.8.6.3 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 no surface occupancy requirements. This alternative would restrict additional leasing on 534,040 acres, or about 86 percent of the planning area. Restrictions could have a significant impact on local lessees and operators. Increased restrictions on leasing in the planning area would be more than the total amount of closures throughout the Green River Management Area. In addition, restrictions on ROWs may limit the ability to develop and move product from within the planning area. Geophysical exploration would be constrained in many areas, which could impact the ability to further develop oil and gas resources. While restrictions and closures would curtail future growth in oil and gas development relative to the No Action Alternative, short-term production levels are still expected to slightly increase. When combined with the Green River Management Area (minus overlapping land areas), which presently restricts oil and gas leasing on 383,370 acres, about 15 percent of the 5.3 million acres would be restricted.

4.8.6.4 Alternative 3

The amount of acreage available for leasing relative to the No Action Alternative would increase. However, restrictions on access could limit growth in mineral development throughout the planning area. This includes lease stipulations, seasonal restrictions, and no surface occupancy requirements. In addition, restrictions on ROWs may limit the ability to develop and move product from within the planning area. Restrictions are not expected to be as significant as under Alternative 2. Adaptive management restrictions could have a significant impact on local lessees and operators if activity restrictions extend far into the future.

4.8.6.5 Preferred Alternative

Restrictions on leasing and access could limit growth in mineral development throughout the planning area. This alternative would restrict additional leasing on 142,630 acres, or about 23 percent of the planning area. When combined with the Green River Management Area (minus overlapping land areas), which presently restricts oil and gas leasing on 383,370 acres, about 8 percent of the 5.3 million acres will be restricted. Other restrictions, such as lease stipulations, seasonal restrictions, and no surface occupancy requirements, could further impact growth potential. Adaptive management restrictions could have a significant impact on local lessees and operators if activity restrictions extend far into the future.

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 provide for protection of the scenic quality of the planning area, having a beneficial impact on visual resources and nonenvironmental effects to resource users. Impacts of implementation of the VRM classifications on other resources and resource

users are discussed in those resources' particular sections. This section describes potential impact on visual resources due to the implementation of management actions for other resource management categories.

An impact on the visual resources would be considered significant if an activity or development occurs in an area that would be incompatible with the VRM classification objective and becomes a dominant feature of the landscape. If the objectives for the preservation of visual resources limit reasonable public use of the planning area or cause economic hardship for developers, a significant impact would occur.

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 designed to mitigate effects. Activities or developments on state or private inholdings would not be significantly different such 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.

In accordance with recent BLM policy (Instruction Memorandum No. 2000-096), VRM Class I would be assigned to WSAs. 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 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 according to BLM policy (Instruction Memorandum No. 2000-096). 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 Steamboat Mountain ACEC (southern portion) and the remaining ACECs would be managed as VRM Class II areas. The areas adjacent to the WSAs 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 serve 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 the VRM objective, which could either benefit or adversely affect the scenic quality of the area.

Managing travel and access throughout the planning area could have beneficial impacts on visual resources by identifying and controlling high-traveled routes and providing for orderly development that would be compatible with VRM objectives. The OHV designations would be compatible with VRM objectives. Any adverse impact to visual resources from surface disturbance or vegetation removal caused by OHVs would be minimal provided OHV users adhere to OHV designations.

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 to 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 the facilities would 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 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 removes vegetation, which could temporarily and sometimes permanently alter the characteristics of the landscape. Below-ground utilities and aboveground pipelines would be compatible with VRM Class III and Class IV designations and could be approved within Class II designations provided adequate mitigation could be implemented, the results of which would not attract the attention of the casual observer. Aboveground powerlines 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 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.

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 so as to blend into the existing landscape of the area. The projected increase in recreationists using the planning area could potentially affect the scenic quality of localized areas that experience increased camping or other use. Any adverse impact would likely be insignificant, as these small areas would be closed if resource damage would occur.

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, and 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.

Cumulative Impacts. Cumulative impacts would include enhancement of visual resources as a result of management and protection of important resources within the planning area. This includes protection of WSAs, ACECs, National Historic Trails, and other important resource areas. Oil and gas development would also impact visual resources through development of wells that alter the visual landscape. Linear facilities such as roads and pipelines would affect visual resources because of their high visibility and the extended periods of time needed for natural vegetation cover to become reestablished. Smoke associated with prescribed fire and wildfire would also cause short-term impacts to visual quality.

4.9.1.3 Alternative 1

WSAs would be managed as VRM Class I areas according to BLM policy (Instruction Memorandum No. 2000-096). 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. Only the South Pass Historic Landscape, Greater Sand Dunes, and White Mountain Petroglyphs ACECs 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 for more opportunities to use and develop the planning area, and thus additional surface disturbance and construction of facilities would be anticipated. Over half the planning area would be classified as VRM Class IV, and thus more effects than would occur under the No Action Alternative (Map 13) would be anticipated.

The management of land and water resources would not have significant impacts on visual resources, similar to the No Action Alternative. Although more range improvements and water development projects would be expected, adverse impacts on the scenic quality of the planning area would be negligible, as 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 similarly to 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 viewers of these resources could occur if the character of the landscape of any respected place is altered to the extent it loses 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 to visual resources in VRM Class II areas from surface disturbance or vegetation removal caused by OHVs would be minimal provided OHV users adhere to OHV designations.

Oil and gas development and production facilities could have adverse impacts on visual resources in VRM Class II areas, similar to the No Action Alternative. However, the overall extent of any impact to Class II areas would be slightly less than that of the No Action Alternative, as 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 to the planning area scenic quality, 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 impact on visual resources, as the areas where development would likely occur would be compatible with VRM Class IV objectives. Aboveground powerlines 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. Similar to the No Action Alternative, surface disturbance associated with mining claims could have the potential to 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 likely would be insignificant. Where mining activities disturb more than five 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 impact on the character of the landscape.

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 could likely be affected by visual intrusions on the landscape that could occur in a majority of the planning area. However visual appeal is subjective, and thus the significance of any impact would vary among observers.

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. Any visual intrusion would not be allowed unless the existing landscape could be preserved or retained, having overall beneficial effects to 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, as there would be less Class II land area with the removal of the Class II designation for the Steamboat Mountain ACEC.

Cumulative Impacts. Cumulative impacts would be the same as those described under the No Action Alternative, except that impacts that enhance visual resources would likely decrease, and impacts that degrade visual resources would increase. This is due to 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.

4.9.1.4 Alternative 2

WSAs would be managed as VRM Class I areas according to BLM policy (Instruction Memorandum No. 2000-096). 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 portions of the National Historic Trail and National Scenic Trails located within the planning area 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, and 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, and thus beneficial impacts on visual resources would be anticipated through preserving and retaining the existing character of the landscape.

Management of land and water resources would not have significant impacts on visual resources, similar to the No Action Alternative. Although range improvements and water development projects would be expected, they would be fewer in number than in the No Action Alternative, and adverse impacts on the scenic quality of the planning area would be negligible, as 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 similarly to 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 contribute 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.

Similar to the No Action Alternative, managing travel and access throughout the planning area could have beneficial impacts on visual resources by identifying and controlling high-traveled routes and providing for orderly development that would be compatible with VRM objectives. The OHV designations would be compatible with VRM objectives, and a majority of the planning area would be closed to OHV use or limit such use to designated roads and trails. Any adverse impact to visual resources from surface disturbance or vegetation removal caused by OHVs would be minimal provided OHV users adhere 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. Facilities in VRM Class III areas would not significantly impact the scenic quality of the area provided 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 limited because of the minimal land area where such facilities could be sited. Below-ground utilities and aboveground pipelines would be compatible with VRM Class III areas and could be approved within Class II designations provided adequate mitigation could be implemented, the results of which would not attract the attention of the casual observer. Aboveground powerlines would not be allowed in the Red Desert Watershed Management Area, benefiting the viewshed in this area. Adverse effects would be less than for the No Action Alternative, as less development would occur. This alternative would have the least effect on scenic quality of the planning area.

Site-specific nonlinear ROWs for microwave, transmitter, and other communication towers would be compatible with VRM Class IV classifications. Since there would be no Class IV areas, there would be no adverse effects to scenic quality from this activity.

The planning area would be withdrawn from mineral location, and thus no adverse impacts on visual resources from such activities would be expected.

Management of recreation resources would not have any impact on the character of the landscape, similar to the No Action Alternative. The types of recreation activities occurring throughout the planning area would be compatible with VRM objectives.

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.

Cumulative Impacts. Cumulative impacts would be the same as those described under the No Action Alternative, except that impacts that enhance visual resources would likely increase, and impacts that degrade visual 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.

4.9.1.5 Alternative 3

WSAs would be managed as VRM Class I areas according to BLM policy (Instruction Memorandum No. 2000-096). 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. Steamboat Mountain ACEC (southern portion) and the remaining ACECs would be managed as VRM Class II areas. The areas adjacent to the WSAs would 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 for opportunities to use and develop the planning area, and 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, and thus beneficial impacts on visual resources greater than the No Action Alternative but less than Alternative 2 would be anticipated through preserving and retaining the existing landscape in these areas.

Management of land and water resources would not have significant impacts on visual resources, similar to the other alternatives. Although range improvements and water development projects would be expected, adverse impacts on the scenic quality of the planning area would be negligible, as 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.

Management of heritage resources would have similar impacts on visual resources as 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 contributes to the sites' eligibility. Protection of Native American respected places would also directly benefit visual resources.

Managing travel and access throughout the planning area could have beneficial impacts on visual resources by identifying and controlling high-traveled routes and providing for orderly development compatible with VRM objectives, similar to the No Action Alternative and Alternative 2. The OHV designations would be compatible with VRM objectives, and any adverse impact to visual resources from surface disturbance or vegetation removal caused by OHVs would be minimal provided users adhere to the 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 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. Facilities in VRM Class III areas would not significantly impact the scenic quality of these areas provided 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 through limiting these activities to areas identified for such use. Below-ground utilities and aboveground pipelines would be compatible with VRM Class III and Class IV and could be approved within Class II designations provided adequate mitigation could be implemented, the results of which would not attract the attention of the casual observer. Aboveground powerlines would not be allowed in the Red Desert Watershed Management Area, benefiting the viewshed in this area. This would reduce adverse impacts to 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 require mitigation to reduce sight intrusion, would benefit scenic quality. Similar to 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, similar to 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 likely would be insignificant. Where mining activities 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 impact 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 in 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.

Similar to 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 landscape. Management of additional areas that would be designated as special management areas would have beneficial effects on the scenic quality of the landscape.

Cumulative Impacts. Cumulative impacts would be the same as those described under the No Action Alternative, except that impacts that enhance visual resources would likely increase, and impacts that degrade visual resources would decrease, to a lesser degree, however, than under Alternative 2. 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.

4.9.1.6 Preferred Alternative

WSAs would be managed as VRM Class I areas according to BLM policy (Instruction Memorandum No. 2000-096). 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 Pinnacles geologic feature, the areas adjacent to the WSAs, and portions of White Mountain and the West Sand Dunes Archeological 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 through 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 to VRM Class III and Class IV areas. 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.

Managing travel and access throughout the planning area could have beneficial impacts on visual resources by identifying and controlling high-traveled routes and providing for orderly development that would be compatible with VRM objectives. The OHV designations would be compatible with VRM objectives. Any adverse impact to visual resources from surface disturbance or vegetation removal caused by OHVs would be minimal provided OHV users adhere to OHV designations.

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 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.

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 removes vegetation, which could temporarily and sometimes permanently alter the characteristics of the landscape. Below-ground 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 powerlines 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. 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 the adverse effect would be less than those under the No Action Alternative.

Withdrawing lands from certain resource uses would have beneficial impacts on scenic quality through 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 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.

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 potentially affect the scenic quality of localized areas that experience increased camping or other use. Any adverse impact would likely be insignificant, as these small areas would be closed if resource damage would occur.

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, and 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.

Cumulative Impacts. Cumulative impacts would include enhancement of visual resources as a result of management and protection of important resources within the planning area. This

includes protection of WSAs, ACECs, National Historic Trails and other important resource areas. Oil and gas development would also impact visual resources through development of wells that alter the visual landscape. Linear facilities such as roads and pipelines would affect visual resources because of their high visibility and the extended periods of time needed for natural vegetation cover to become reestablished. Smoke associated with prescribed fire and wildfire would also cause short-term impacts to visual quality.

Compared to the No Action Alternative, impacts that enhance visual resources would likely increase, and impacts that degrade visual resources would decrease slightly. This is due to additional protections afforded to important and sensitive resources and increased restrictions on linear facilities.

4.10 SPECIAL MANAGEMENT AREAS

Special management areas (for convenience, referred to in this section as SMAs) require special management prescriptions to ensure that these areas and their resources are managed and protected from irreparable damage. These areas include WSAs, ACECs, special recreation management areas (SRMAs), 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 to resource users. Impacts that implementation of SMA management prescriptions have to other resources and resource users are discussed in those particular resource sections. This section describes potential impacts on SMAs because of 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 occurs 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 are adversely affected to the point that the current SMA no longer meets 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 be significantly affected by SMA management prescriptions, nor would they significantly affect the criteria necessary to maintain designations.

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 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 from development activities, and season of use, providing for protection of habitat used by wildlife and potential 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 to the resources in SMAs, as 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, and thus the preparation of recreation site plans and placement of interpretive signs would have beneficial impacts to 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 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 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 in the separate resource management categories.

4.10.1.2 No Action Alternative

Exploration for coal and other solid minerals would be allowed in the western portions of the Red Desert Watershed not contained within a WSA and in portions of South Pass Historic Landscape ACEC. However effects from exploration are expected to be minimal. Leasing of coal using subsurface mining and controls on surface facilities, subject to specific limitations for resource protection, would be allowed in Steamboat Mountain ACEC and the eastern part of Greater Sand Dunes ACEC. The WSAs and remaining ACECs would be closed to exploration and leasing, benefiting SMAs by protecting the resources from disturbance.

Managing travel and access throughout the planning area could have beneficial impacts on SMA resources by identifying and controlling high-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 to the integrity and maintenance of the designated area from surface disturbance or vegetation removal caused by OHVs would be minimal provided OHV users adhere 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 because they 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 the areas, including the interim management guidelines for WSAs that prohibit impairment, any impact would be insignificant.

Withdrawing lands from certain resource uses and revoking existing withdrawals would impact SMA resources and resource users. The oil shale and coal classification would be revoked and, upon revocation, all SMAs, with the exception of White Mountain Petroglyphs, 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 to 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 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 and for the southern portion of Steamboat Mountain ACEC, the remaining ACECs, and areas adjacent to the WSAs, would limit the design and placement of structures that would not blend in with the landscape. The western part of the Red Desert Watershed SMA 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.

Cumulative Impacts. Cumulative impacts could include degradation of visual resources, soils, watershed resources, and vegetation caused by development activities within and outside the SMAs. Increased development outside SMAs could also cause these areas to be used more heavily by displaced wildlife. Restrictions on surface disturbance within SMAs would help reduce impacts.

4.10.1.3 Alternative 1

Exploration for coal and other solid minerals would be allowed in all SMAs except the WSAs, however effects from exploration are expected to be minimal. Leasing of coal using subsurface mining and controls on surface facilities, and subject to specific limitations for resource protection, would be allowed in the eastern part of Greater Sand Dunes ACEC and Steamboat Mountain ACEC.

All ACECs, except the eastern part of Greater Sand Dunes and the portion of Greater Sand Dunes within a WSA, would be open to solid mineral leasing consideration, potentially

causing a loss of resources which may affect criteria for ACEC designation and therefore have a significant adverse impact on all ACECs. However no solid mineral development is expected during the planning period, reducing or eliminating the potential effects. WSAs would be closed to leasing, having a beneficial impact by protecting the resources from disturbance.

OHV designations and managing travel and access throughout the planning area would be the same as for the No Action Alternative.

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, causing significant adverse impacts to SMA resources through adverse effects which may affect criteria for SMA designation. 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 certain resource uses 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 cause 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 impact on the characteristics of the area that support its special designation.

Effects from VRM classifications would be the same as under the No Action Alternative, except that the western part of the Red Desert Watershed SMA would be managed as VRM Class IV. This may cause significant adverse impacts to the existing character of the landscape by compromising the resource integrity for which the area was designated.

Cumulative Impacts. Cumulative impacts would be the same as those described in the No Action Alternative, except that impacts would be greatest under this alternative because of increased development activities. Impacts could be significant if they change the characteristics protected by the SMA designation.

4.10.1.4 Alternative 2

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 to the SMAs by protecting the resources from the surface disturbance associated with mineral development activities.

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 high-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 to the integrity and maintenance of the

designated area from surface disturbance or vegetation removal caused by OHVs would be minimal provided OHV users adhere to OHV designations.

Adverse impacts to 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 less than under the No Action Alternative because of ROW avoidance or exclusion and controlled surface use or no surface occupancy prescriptions for all SMAs.

The VRM classifications under this alternative would have greater beneficial effects to SMA resources than under the No Action Alternative, because all SMAs would be classified as Class I.

Additions and expansions to 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. 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 research and education, as the paleosol deposition area has outstanding scientific values. The RNA primarily would be used for nonmanipulative research and baseline data gathering. The dunal ponds within the Sand Dunes WSA portion of the ACEC would also be proposed as an RNA. 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 Steamboat Mountain ACEC to include Indian Gap, the face of Steamboat Mountain, and the areas where the elk crucial winter range and birthing areas overlap, would ensure protection of important wildlife habitat, a unique vegetation type, and a significant heritage resource. 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 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 of rare and endemic plants and plant communities and be designated an ACEC. These ACECs 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 on these species by raising awareness to the species and providing protective measures for their propagation and survival.

The addition of a WSA would significantly benefit the natural resources within its particular area. The Pinnacles WSA was proposed for evaluation of its wilderness values and was found to be a roadless area of at least 5,000 acres, containing the necessary characteristics for wilderness review.

Access to state or private property would be allowed under wilderness provisions, or exchanges of such properties would be pursued to maintain the integrity of the wilderness values of the area. A parcel of state land would be surrounded by WSAs with the addition of the proposed Pinnacles. However an existing road provides access to the parcel, and the presence and any future maintenance of this road would not impact the manageability of the Pinnacles as a WSA. The proposed management action to pursue land exchanges for improving management of resources and minimizing habitat fragmentation, would apply to this parcel of state land, thus improving the manageability of the area as a WSA.

There are no existing mining claims within the Pinnacles area, thus there would be no impact on the manageability of the area as a WSA because of 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. Thus the manageability of this area as a WSA 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 provided the construction, use, and maintenance of the facilities are in compliance with WSA management prescriptions. There are currently no water developments in the Pinnacles area, thus the manageability of the area as a WSA would be compatible with existing livestock grazing operations.

With the existing and proposed management actions, the proposed Pinnacles WSA could be managed as a WSA and thus would meet the suitability determination for designation as wilderness.

***Cumulative Impacts*.** Cumulative impacts would be the same as those described in the No Action Alternative, except that impacts would be least extensive under this alternative because of decreased development activities.

4.10.1.5 Alternative 3

Effects of exploration and leasing of coal and other solid mineral resources would be the same as for the No Action Alternative.

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 through identifying and controlling high-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 to the integrity and maintenance of the designated area from surface disturbance or vegetation removal caused by OHVs would be minimal provided OHV users adhere 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 no surface occupancy in the majority of SMAs (Map 39 and Map 40).

The withdrawal of lands from certain resource uses would have the same impacts on the SMA resources and resource users as the No Action Alternative.

The VRM classifications under this alternative would have greater beneficial effects to SMA resources than under the No Action Alternative because all SMAs would be classified as either Class I or Class II.

Additions and expansions to 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. The proposed expansion of 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 planning area to include BLM-administered land occupied by all Wyoming BLM special status plant species would provide protective measures for their propagation and survival. However the benefits of protection of resources from ACEC expansions would be less than under Alternative 2 because of less area protected and no further evaluation of areas as RNAs.

The addition of a WSA would significantly benefit the natural resources within its particular area, similar to Alternative 2. As described in Alternative 2, the Pinnacles WSA was proposed for evaluation of its wilderness values and was found to be a roadless area of at least 5,000 acres, containing the necessary characteristics for wilderness review.

Access to state or private property would be allowed under wilderness provisions, or exchanges of such properties would be pursued to maintain the integrity of the wilderness values of the area. A parcel of state land would be surrounded by WSAs with the addition of the proposed Pinnacles. However an existing road provides access to the parcel and the presence and any future maintenance of this road would not impact the manageability of the Pinnacles as a WSA. The proposed management action to pursue land exchanges for improving management of resources and minimizing habitat fragmentation would apply to this parcel of state land, thus improving the manageability of the area as a WSA.

There are no existing mining claims within the Pinnacles area, thus there would be no impact on the manageability of the area as a WSA because of existing or future claims.

Because this area meets the characteristics of wilderness, no new leases would be offered, and any expiring leases would not be reoffered. Thus the manageability of this area as a WSA 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 provided the construction, use, and maintenance of the facilities are in compliance with WSA management prescriptions. There are currently no

water developments in the Pinnacles area, thus the manageability of the area as a WSA would be compatible with existing livestock grazing operations.

With the existing and proposed management actions, the proposed Pinnacles WSA could be managed as a WSA and thus would meet the suitability determination for designation as wilderness.

Cumulative Impacts. Cumulative impacts would be the same as those described in the No Action Alternative, except that impacts would be less extensive under this alternative because of decreased development activities.

4.10.1.6 Preferred Alternative

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 for protection of habitat used by wildlife and potential 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 the 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 to the resources in SMAs, as 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, and thus the preparation of recreation site plans and placement of interpretive signs would have beneficial impacts to 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.

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 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.

Exploration for coal and other solid minerals would be allowed in the western portions of the Red Desert Watershed not contained within a WSA and in portions of South Pass Historic Landscape ACEC. However, effects from exploration are expected to be minimal. Leasing of coal using subsurface mining and controls on surface facilities, subject to specific limitations for resource protection, would be allowed in Steamboat Mountain ACEC and the eastern part of Greater Sand Dunes ACEC. The WSAs and remaining ACECs would be closed to exploration and leasing, benefiting the SMAs by protecting the resources from disturbance.

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 high-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 to the integrity and maintenance of the designated area from surface disturbance or vegetation removal caused by OHVs would be minimal provided OHV users adhere 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 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 the areas. However, with implementation of the adaptive management strategy and the management prescriptions for the areas, 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.

Withdrawing lands from certain resource uses and revoking existing withdrawals would impact SMA resources and resource users. The oil shale and coal classification would be revoked and, upon revocation, all SMAs, with exception of White Mountain Petroglyphs, 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 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 and for Steamboat Mountain ACEC, the remaining ACECs, and the area adjacent to WSAs, would limit the design and placement of structures that would not blend in with the landscape. The western part of the Red Desert Watershed SMA 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 geographic area would be an exclusion area for ROWs, closed to salable mineral activities, and classified as a VRM Class II area. The area within one-half mile of the Pinnacles geologic feature would also be closed to the use of explosives and limited to designated roads and trails for vehicular travel. These restrictions would protect resources within this area, preserving unique geologic features from surface disturbing and disruptive activities.

The West Sand Dunes Archaeological District is a significant heritage resource and 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 archaeological 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.

Cumulative Impacts. Cumulative impacts could include degradation of visual resources, soils, watershed resources, and vegetation caused by development activities within and outside SMAs. Increased development outside SMAs could also cause these areas to be used more heavily by displaced wildlife. Restrictions on surface disturbance within SMAs would help reduce impacts. Impacts could be less extensive than under the No Action Alternative because of staged development activity.

4.11 AIR RESOURCES

Air resources are characterized by the existing concentration of various pollutants and the conditions that influence the quality of the air, such as visibility.

BLM manages air resources in terms of ambient air quality, visibility, and atmospheric deposition. Air quality impacts are based on federal and state laws and regulations and are regulated 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. Air quality in the JMH planning area is regulated by the Wyoming Department of Environmental Quality.

The significance of impacts on air quality is based on the federal and state pollution regulations and standards. A significant impact would be a violation of the NAAQS or WAAQS, the further aggravation of an existing air quality violation, or exposure of sensitive receptors to increased pollutant concentrations. The State of Wyoming is currently in attainment for all ambient air quality standards, thus new emission sources are regulated by PSD standards. An impact would be significant if it degrades the air quality (visibility) of

areas designated as PSD Class I or Class II. A significant impact to air resources would 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 will result in the exceedence of any of these air quality standards, it has been assumed that the results of the 1999 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.

4.11.1 Potential Impacts on Air Quality

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 BLM land use activities result in emissions to the air. Air emissions are associated with oil and gas exploration and production activities for which 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 may 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 (VOCs), sulfur dioxide (SO_2), nitrogen oxides (NOx), and particulate matter (PM). Drilling, completion, and repair activities all result in short-term emissions, whereas 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 the 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.

Emission rate estimates from the Pinedale Anticline Project included assumptions for projected oil and gas development in JMH, 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 planning area and approximately 3,480 hp of compression (based on 60 hp

per producing well) would be used. Only NOx emissions were calculated for far-field impacts because PM_{10} and SO_2 were expected to be negligible. The emission factor used for wells was 0.065 tons NOx per well per year, and for compressors was 1.5 grams NOx per brake horsepower (bhp) hour. 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 WAAQS for all pollutants. The projected maximum impact of cumulative sources for annual NOx emissions was 0.03 micrograms per cubic meter (Pg/m^3), which was less than 1 percent of background concentration (9 mg/m3) and well below the ambient standards (see Figures A15-9 and A15-10 in Appendix 15).

In the Pinedale Anticline cumulative impact analysis, 110 wells and related compression (estimated 3,480 hp) were within JMH. This is 1.5 percent of the 7,211 total sources. The Hydrocarbon Occurrence and Development Potential Report for JMH projected a maximum of 132 producing wells over the planning period, which would represent 1.8 percent (a 0.3 % increase from the Pinedale Anticline) if the cumulative sources are 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 operating. Since the annual NOx concentration from cumulative sources was determined to be 0.03 Pg/m3, the difference between 110 and 132 wells in the JMH planning area is unlikely to result in an appreciable change in this 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 the changes since 1999 are also small, additional air quality modeling to account for the revised Hydrocarbon Occurrence and Development Potential Report for the JMH planning area is not necessary.

The Pinedale Anticline project modeling also calculated visibility impairment on PSD Class I areas in the model domain. Visibility was estimated in terms of change in deciview (dv) from background visibility. The deciview is a measurement of visibility and was described in Chapter 3. The model results reported two thresholds of visibility change: days with greater than 1 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 the 1.0 dv is a threshold in the 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 per year with a change greater than 0.5 dv. There were no areas where visibility change exceeded 1.0 dv, and thus no significant impacts were anticipated. As noted above, the model input includes meteorological data. The visibility results indicated that some of the 9 days of greater than 0.5 dv were attributed to meteorological conditions and not pollutants. Given the change in pollutant concentrations previously described, the addition of 22 wells in the JMH area would likely have little effect to the visibility modeling results. Thus the potential for any significant impact on visibility from cumulative oil and gas emissions sources would be negligible.

The air pollutant emissions used in the above discussion are comparable to those expected from the maximum projected development alternative (Alternative 1) for the 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 Preferred Alternative.

4.11.1.2 Cumulative Impacts

No Action Alternative

Cumulative impacts to air quality would include 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 (PAHs), as well as reduced visibility. Vehicular activity would also produce emissions that would degrade air quality.

Assumptions used in modeling air emissions for the Pinedale Anticline Project included maximum development for the JMH planning area. Since there would be no significant impact on air resources under this maximum scenario, there would also be no significant impact expected under the lesser development scenarios of the No Action Alternative, Alternative 2, Alternative 3, or the Preferred Alternative.

Alternative 1

Cumulative impacts to air quality would be the same as the No Action Alternative, except impacts would be greater because of anticipated increases in mineral development and vehicular activity.

Alternative 2

Cumulative impacts to air quality would be the same as the No Action Alternative, except impacts would be substantially reduced because of increased restrictions on mineral development, the prohibiting of development of new leases within sensitive resource areas, and the discontinuing of operation of certain wells and compressors through lease buy-backs.

Alternative 3

Cumulative impacts to air quality would be the same as the No Action Alternative, except impacts would be slightly reduced because of increased restrictions on mineral development and adaptive management measures that may impose timing requirements and cause certain leases to be suspended.

Preferred Alternative

Cumulative impacts to air quality would include 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 PAHs as well as reduced visibility. Vehicular activity would also produce emissions that would degrade air quality.

Assumptions used in modeling air emissions for the Pinedale Anticline Project included maximum development for the JMH planning area. Because there would be no significant impact on air resources under this maximum scenario, there would also be no significant impact expected under the Preferred Alternative.

Impacts would be reduced as compared to the No Action Alternative because of increased restrictions on mineral development and adaptive management measures that may impose timing requirements and cause certain leases to be suspended.

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 cause significant impacts to 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, while total employment increased over time, it is reasonable to assume that in any given year, total employment may deviate 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 planning area do not exceed an increase or decrease of 5 percent of the trend, the impact would not be considered significant. The threshold was reduced by at least 50 percent for employment to more closely represent fluctuations during the 1990s.

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 have 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, ad valorem taxes have 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 area were estimated using an input-output (I/O) model developed for Southwest Wyoming by the University of Wyoming. Input-output 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 located 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 utilizing the JHM area. Although this consideration presents a challenge to 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 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 may 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, etc.). 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 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 may 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 section discusses 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 methane 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 or exchange existing leases from willing leaseholders in areas that should be closed to leasing for protection of sensitive resources (Appendix 16). The Preferred Alternative 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
Preferred	115	90	205	107

Grazing

The 5-year historic average was used as a basis in developing 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 for 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 last 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 affect 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 healthy rangeland standards 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 area could also impact grazing use during the study period. The elk herd objective for JMH is expected to increase to 1,200 from the existing objective of 500. This could impact 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. Greater Sage-Grouse hunting is expected to remain constant during the first part of the study period and then be eliminated with the expectation that the species would be listed as threatened or endangered under the Endangered Species Act. 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 (for convenience in this context, referred to as RVDs) 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 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 Preferred Alternative 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 positive economic benefits to the local communities near JMH. Most benefits will be the result of increased oil and gas development, though continued benefits will be realized through grazing and recreational activities. All activities are expected to support on average over 120 jobs per year.

While the modeling efforts do not indicate where the employment impacts would occur, it can be deduced that they would be focused in Sweetwater County, with 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 during the mid-1970s. This is due to the fact that 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 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 over 90 percent of total earnings under all alternatives. On an annual basis, total real earnings would increase between $2.4 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 between $85 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 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 last 20 years. If gas production follows along a similar trend, then 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.

However, it would be likely that most of this impact would occur to 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 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. The average annual employment supported by activities in JMH would range from 128 jobs per year under Alternative 2 to 188 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 planning area would approach 161 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 188 jobs, with over 80 percent of this employment occurring in the oil and gas industry. Employment impacts would not be considered significant, as Alternative 1 would be expected to support 27 additional 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 considered insignificant to the regional economy.

4.12.4.3 Alternative 2

Alternative 2 would be expected to support, on average, 128 jobs per year. The reduction of 33 average jobs per year 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 150 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 Preferred Alternative

Annual employment supported by activities within JMH under the Preferred Alternative is estimated to average 152 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 represent the increase in potential earnings over the 20-year study period as a result of gas development, grazing, and recreation in JMH under each alternative. Gas development accounts for over 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 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 would be estimated at $66 million over the 20-year study. 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 to 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 the No Action Alternative. On average, total earnings would likely increase by $2.4 million per year, which would be $495,000 lower than 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 lower than the No Action Alternative. On average, total earnings would increase $2.8 million per year, which would be $132,000 lower than the No Action Alternative. 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 Preferred Alternative

The Preferred Alternative 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 the No Action Alternative. On average, total earnings would increase $2.8 million per year,

which would be $115,000 lower than the No Action Alternative. 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
Preferred Alternative	$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 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 only receive a percentage of federal royalties and severance taxes collected on production originating on public lands. Figure 18 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 that 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 may 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 to 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 than 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 during 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 Preferred Alternative

Mineral revenues under the Preferred Alternative are estimated to total $98 million during 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 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.

4.12.7 Cumulative Impacts

4.12.7.1 No Action Alternative

Activities occurring within the planning area are expected to increase over the planning period. It is expected that oil and gas development will increase in the early years of the planning period, with production declining as older wells are taken offline. Employment and income are expected to increase under this alternative, with most of these impacts occurring in Rock Springs and Green River, where many of the goods and services are provided for oil and gas production. Demand for housing and schools is expected to increase slightly with this activity, but not to the levels reached during the boom period of the mid-1970s. Demands on other community facilities, such as roads, water and sewer, and recreational facilities, are not expected to be significant.

4.12.7.2 Alternative 1

Cumulative impacts would be the same as those described in the No Action Alternative.

4.12.7.3 Alternative 2

Cumulative impacts would be the same as those described in the No Action Alternative.

4.12.7.4 Alternative 3

Cumulative impacts would be the same as those described in the No Action Alternative.

4.12.7.5 Preferred Alternative

Activities occurring within the planning area are expected to increase over the planning period. It is expected that oil and gas development will increase in the early years of the planning period, with production declining as older wells are taken offline. Employment and income are expected to increase under this alternative, with most of these impacts occurring in Rock Springs and Green River, where many of the goods and services are provided for oil and gas production. Demand for housing and schools is expected to increase slightly with this activity, but not to the levels reached during the boom period of the mid-1970s. Demands on other community facilities, such as roads, water and sewer, and recreational facilities, are not expected to be significant.